OVERSIGHT ON ISSUES PERTAINING TO VETERANS' EXPOSURE TO IONIZING RADIATION

HEARINGS

BEFORE THE

COMMITTEE ON VETERANS' AFFAIRS
UNITED STATES SENATE

NINETY-NINTH CONGRESS

FIRST SESSION

NOVEMBER 14 AND DECEMBER 11, 1985

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OVERSIGHT ON ISSUES PERTAINING TO VETERANS' EXPOSURE TO IONIZING RADIATION

THURSDAY, NOVEMBER 14, 1985

U.S. SENATE,
COMMITTEE ON VETERANS' AFFAIRS,
Washington, DC.

The committee met, pursuant to notice, at 9:50 a.m., in room SR-418, Russell Senate Office Building, Hon. Frank H. Murkowski (chairman of the committee) presiding.

Present: Senators Murkowski, Simpson, Specter, Denton, Cranston, Matsunaga, Mitchell, and Rockefeller.

Also present: Senator Warner.

OPENING STATEMENT OF CHAIRMAN MURKOWSKI

Chairman MURKOWSKI. Good morning.

The Senate Committee on Veterans' Affairs is holding a hearing concerning veterans' exposure to ionizing radiation.

I want to welcome you all this morning.

The U.S. Atmospheric Nuclear Test Program began, as some of you know, in 1945. Forty years later, the case is still open on the effects of that experience on the approximately 220,000 veterans who participated in the program, which lasted until about 1963.

There are unresolved questions which continue to haunt some of the veterans, the public, and the Congress. But no matter how many mathematical formulas are developed, we may never know how much radiation these veterans were actually exposed to at any one time.

No matter how many scientific studies are conducted, the effects on radiation exposure of the Atomic Test Program will never be known with any degree of accuracy.

And no matter how uniform and fair the Veterans' Administration's claims adjudication process is, some veterans unfortunately may never be able to establish to their or their families satisfaction, that the disabilities are related to that participation in the test program.

Unfortunately, the difficulty today is the question of what constitutes a service-connected injury or illness. That question is less clear than it once was. A bullet wound or a bayonet cut is certainly an identifiable thing; quite different are the hazards of the modern, high-technology battlefield. Not only does it hold more varied dangers, but in many cases, the symptoms or injuries do not appear for years, or, in some cases, several decades.

This creates a number of dilemmas for officials attempting to determine whether latent illness is related to military service or not. Even though we are dealing with these and other uncertainties, we continue to be committed to the search for answers and alternatives for our veterans when there are no exact answers available.

October 1984, Congress enacted a major legislative initiative to try to be more specific in addressing the needs of this group of patriotic American veterans. Public Law 98-542, the Veterans' Dioxin and Radiation Exposure Compensation Standards Act, required the Veterans' Administration to establish uniform guidelines for adjudicating veterans' compensation claims for disabilities which may be due to ionizing radiation exposure.

The purpose of the legislation was to ensure that a fair, adequate, and equitable administrative remedy would be made available to these veterans. On August 26, 1985, the Veterans' Administration published the final version of the regulation.

The purpose of our hearing today is to review these regulations specifically, and the VA's progress in the implementation of these regulations.

Prompt and proper implementation of appropriate regulations is, of course, very important in light of the enactment of Public Law 98-525, the Defense Authorization Act of that same year. Section 1631 concerns the judicial remedies available to veterans who were involved or participated in the Atomic Weapons Test Program, or in connection with the American Occupation in Hiroshima and Nagasaki after the Second World War. We will discuss the impact of section 1631 on the Atomic Test Program participants.

I welcome all the distinguished guests and Members that are with us this morning, and those in the audience. I hope that the testimony that we will hear will shed light on the current status of the efforts to be responsive to the needs of America's veterans.

I look forward to hearing your testimony, and we will proceed after opening statements from my colleagues.

I would like to introduce Senator Alan Cranston, the senior minority member of the Senate Veterans' Affairs Committee for his opening statement.

I wish you a good day, Alan.

OPENING STATEMENT OF SENATOR CRANSTON

Senator Cranston. Thank you very much, Frank—and the same to you.

We have been through a lot of work lately on veterans, starting early and late yesterday, and on to today.

Chairman Murkowski. We sure have.

Senator Cranston. I join in welcoming those of you who are scheduled to testify before the committee, as well as all others present today.

Helping veterans who were exposed to radiation during their service and helping the families of those veterans has been a cause to which I have long been committed.

I chaired our committee's first hearing on this subject in 1979, and I have been very actively involved since that time in both legislative and oversight matters.

The primary focus of our 1979 hearing was on issues relating to the handling of VA disability claims arising from in-service exposure to ionizing radiation.

Those issues are still before us today, 6 years later. We have made some progress, but more—much more—needs to be done before we can regard this issue as resolved.

I want to review briefly some of the progress and comment on some of the current issues.

In 1981, I proposed, and Congress enacted, legislation to require the VA to provide health care to radiation-exposed veterans for conditions not caused by another factor.

Just yesterday, there was final Senate passage of legislation I proposed this year to extend this special authority until 1989. Final House action is expected momentarily this morning. So, I think we have clearly acted to ensure that these veterans are provided necessary health care by the VA.

With regard to VA compensation, in October 1984, legislation former Chairman Alan Simpson and I authored was enacted to require the VA to develop, through a process allowing for public participation, special regulations prescribing uniform guidelines for resolving claims for VA compensation benefits for these veterans and their survivors.

The regulations under this process have now been issued, and I look forward to hearing the views of today's witnesses on them.

On the issue of scientific proof regarding these claims, in November 1983, Congress enacted my legislation calling for a major study of the health of veterans exposed to nuclear test radiation.

Serious questions have been raised by the VA and the Office of Technology Assessment about whether a scientifically valid study can be conducted.

That matter is pending with the VA Administrator at this time. I wrote the Administrator on July 24, 1985, and urged that he not find the study unfeasible without considering a variety of alternatives I proposed, and until the GAO report I had requested on the two nuclear tests at "Operation Crossroads" had been released and its implications thoroughly evaluated.

On August 26, the Administrator agreed to defer his decision.

Mr. Chairman, I ask that these two letters be printed in the record at the conclusion of my remarks.[1]

Chairman MURKOWSKI. Without objection.

Senator CRANSTON. One thing is clear to me. Our Government deliberately exposed these people to ionizing radiation. There is no way the veterans can find out how much and what the effect was.

I said 6 years ago—and I repeat now with even greater conviction in view of what has come to light, and is coming to light about what happened before, at, and after those tests—that the decision was unjustifiable when it was made.

In hindsight, it was indefensible. In my view, it is the moral obligation of the Government, a high moral obligation, to find out the facts about the health effects of those nuclear tests on the test participants.

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[1] See pp. 7 and 9.

If it is determined that it is scientifically infeasible to study the nuclear test population so as to develop some definitive information about their morbidity and mortality status, then we must do everything possible in the VA claims process to give the benefit of reasonable doubt to these veterans and their survivors.

This is particularly vital in view of the provision of law in Title 38 that bars veterans from gaining court review of VA decisions denying their claims for benefits, and in view of the provisions of the Warner amendment, cutting off their last avenue to judicial review, by foreclosing suits against nuclear test contractors.

Of course, on the general issue of judicial review of VA decisions, the Senate has, for the fourth time, passed legislation this year, on July 30, in S. 367 to repeal that bar to court access.

An additional reason why I believe it is so important that we give these veterans and survivors every benefit of reasonable doubt is the forthcoming GAO report on "Operation Crossroads" which I mentioned a moment ago. That report, which I requested in August 1984 will, I anticipate, cast serious doubt on the adequacy of the safety procedures in place at those nuclear tests—and perhaps others—and about the subsequent estimates by the Defense Nuclear Agency of the exposure to radiation of the 42,000 service personnel who were involved at Crossroads.

That GAO report will be released by early December.

Mr. Chairman, I regret that it was not possible to accommodate my request that representatives of the GAO and of the Defense Nuclear Agency testify today. Other Members of the minority also requested witnesses who were not invited. I understand fully the limitations of time that we all face. But because of the importance of the issues under consideration and of the desires of minority Members for various witnesses to appear, I am invoking paragraph 4(d) of rule 26 of the Standing Rules of the Senate in order that a minority day of hearings be scheduled at a date convenient to the chairman and to me in the next month.

Mr. Chairman, I would be willing to Chair such a day of hearings if we cannot find a time that is convenient for both of us. [Applause.]

Chairman MURKOWSKI. I wonder if I might ask the Senator what witnesses were denied an opportunity to appear before this hearing, because I was not aware of any. I was aware that Senator Mitchell had made a request, but those individuals are represented here this morning, and I know of none who were denied.

So if there are any, I would like to have it evidenced in the record.

Senator CRANSTON. Yes.

Well, I have not said this in any critical sense. I know the time restraints, but we did——

Chairman MURKOWSKI. Well, I know, but there was a reference made, and if that is the case, I would like to know about it.

Senator CRANSTON. Well, we requested that GAO, for an example, be a witness, and we were told there was not the opportunity for that today. That does not mean that they cannot find further time.

Chairman MURKOWSKI. Well, I was under the impression that had been cleared with your side, and you had fully agreed to that.

Senator **Cranston**. Well, we fully accept today's——

Chairman **Murkowski**. My point is that I think we have got a hearing that obviously is not a bipartisan hearing.

Senator **Cranston**. Of course.

Chairman **Murkowski**. And I want to keep it that way.

Senator **Cranston**. Yes.

Chairman **Murkowski**. And I think your remarks alluded, at least, that we had denied witnesses, and I want to make sure the record reflects accurately that we have not denied any witnesses.

Senator **Cranston**. Well, this opportunity for only having so many witnesses in any given day rather obviously——

Chairman **Murkowski**. That is correct.

Senator **Cranston**. So I just want to see to it that we do have other witnesses that I think it is necessary to have here.

Chairman **Murkowski**. I could not agree with you more. But just for the record, there were no witnesses denied.

Senator **Cranston**. In terms of our final consideration of the matter, I fully agree, and I appreciate your recognition that we need further study.

Let me go on just briefly to say that the principal focus of such a day of hearings would be to consider the GAO report on the Crossroads test. I look forward to receiving and reviewing the views of the VA, DNA, the veterans' organizations, including the National Association of Atomic Veterans, and the National Association of Radiation Survivors, and other interested parties on this very important forthcoming GAO report.

And the report is not out yet, so we need to evaluate it after it is out.

With specific reference to the Warner amendment, while I have no objection to our committee considering the impact of that legislation in the context of reviewing the status of VA efforts relating to claims from veterans exposed to radiation, I firmly believe that our committee is not the correct forum in which that legislation should be evaluated.

That is why last February, I urged the chairman of the Judiciary Committee, who is our colleague on this committee, Senator Thurmond, to hold hearings on the Warner amendment, which I believe is unquestionably under that committee's jurisdiction.

Thus far, the Judiciary Committee has not done so.

The fact that this legislation was adopted with neither the House nor the Senate Judiciary Committee holding any hearings on it, or considering it at all, is the clearest sort of indication that it did not receive proper and sufficient scrutiny before it was enacted.

I join with the many individuals and groups that have written to our chairman and other members of this committee urging that our committee recommend that the Senate Judiciary Committee hold hearings to consider the Warner amendment. I will be working with members of the Judiciary Committee, particularly the five who also serve on our committee, as well as Senator Simon, who will be with us this morning, to bring legislation before that committee, to repeal the Warner amendment, in order to focus that committee's attention on the issue, and to ensure that the matter will be considered carefully.

I also want to note that I have already asked GAO to investigate the disclosure this morning, that Air Force B-57's with crews flew through the six nuclear clouds in the Operation Redwing series in the Pacific in 1956, and that members of the crew wore film badges that showed exposure up to 40 rems of ionizing radiation.

This particular operation apparently involved at least 66 crew members, and we must pursue this matter aggressively with DNA after we get a verification of the facts from GAO.

Again, I welcome all other witnesses who will appear before the committee today, and thank them for their cooperation and assistance.

If I am not able to remain for the full hearing, I will carefully review all the testimony and will have some written follow-up questions.[1]

Finally, I am delighted to join in welcoming our colleague from Virginia, Senator Warner, who will be here, and Illinois Senator Simon.

I know that Senator Simon has been a very staunch advocate, both in the House and now in the Senate, on behalf of veterans exposed to radiation from nuclear blasts. I look forward to continuing to work closely with him and other concerned Senators on this significant issue.

I also welcome Representative Lane Evans this morning, a very able member of the House Veterans' Affairs Committee, who has very deep feelings about the radiation nuclear test issue because his father was a participant at the Crossroads test.

Mr. Chairman, thank you very much.

Chairman MURKOWSKI. Thank you, Senator.

[The following letters were supplied for the record:]

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[1] See p. 325.

FRANK H. MURKOWSKI, ALASKA, CHAIRMAN

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United States Senate

COMMITTEE ON VETERANS' AFFAIRS
WASHINGTON, DC 20510

July 24, 1985

Honorable Harry N. Walters
Administrator of Veterans' Affairs
810 Vermont Avenue, N.W.
Washington, D.C. 20420

Dear Harry,

I have recently received and reviewed a copy of the July 1985 Office of Technology Assessment Staff Memorandum entitled "An Evaluation of the Feasibility of Studying Long-Term Health Effects in Atomic Veterans", which was prepared in response to your December 19, 1984, request that OTA review a proposed protocol for a study of veterans exposed to radiation and advise you as to the feasibility of such a study. I am writing to express my views on this issue in light of the mandate in section 601 of Public Law 98-160 that such study be carried out.

The OTA staff memorandum appears to me to be very well done and quite comprehensive, and I have no basis for disagreeing with the OTA staff conclusions that, first, a study "carried out in accordance with the outlines of the VA plan would not produce meaningful scientific results" and, second, that "a study of the group of 1200 atomic veterans with more than 5 rem exposure [an option OTA considered on its own initiative] would be even less powerful than would the study of the entire cohort."

Notwithstanding these conclusions regarding the likely merits of comprehensive studies, however, I continue to believe that valid study, within the context of section 601, of the adverse health effects of exposure to radiation among veterans exposed during the nuclear test program or in connection with the occupation of Japan following World War II can be carried out. Therefore, I urge you to consider, prior to making any final decision that such study is infeasible, the feasibility of study approaches other than those reviewed by OTA. In this regard, I believe that it is important to note that the study mandate clearly contemplates, in section 601(a)(1)(B) of P.L. 98-160, that, even if it is determined that it is not feasible to carry out some elements of the mandated study, other elements as to which a determination of infeasibility cannot be made would continue to be required.

Among the possible study approaches that I urge you to consider before making any final decision are two that are discussed in the OTA staff memo -- namely, periodic follow-up studies of the veterans who witnessed the SMOKY shot and a study of the veterans who were present at the tests carried out during Operation Crossroads (with comparisons being made between the health status of these veterans with an appropriately designed control group of veterans who were not exposed to radiation during the test program). This latter study would appear to be particularly important in light of the concerns about the levels of exposure and safety precautions at Crossroads which were raised by the Operations Radiological Safety Officer at the shots, the late Colonel Stanford Warren, in various memoranda and letters which were presented to the Congress in 1983 and which have been the subject of a nearly completed GAO study. (I understand that your staff has already reviewed this study in draft.) In addition to these two studies, there may be others focusing on particular shots or series of shots or some other subset of the total population of veterans exposed to radiation that could be the subject of valid study, and I urge you to look for such options before reaching any final decision regarding the infeasibility of carrying out any study under section 601 of P.L. 98-160.

In addition, I urge you to have members of your staff contact appropriate staff at the National Research Council (NRC) to discuss with them the possibility of the VA providing funding support for a further analysis, using a properly constituted control group of veterans, of the information gathered by the NRC in connection with the recently reported study entitled "Mortality of Nuclear Weapons Test Participants". Such an analysis, which members of the Committee staff have already discussed with NRC, would be a valuable addition to the body of information available at present on the health status of veterans exposed to radiation.

Thank you for your continued cooperation.

With warm regards,

Cordially,

Alan

Alan Cranston

cc: Dr. John Gibbons

Office of the
Administrator
of Veterans Affairs

Washington, D.C. 20420

Veterans
Administration

AUG 28 REC'D

AUG 26 19

Honorable Alan Cranston
Ranking Minority Member
Committee on Veterans' Affairs
United States Senate
Washington, D.C. 20510

Dear Senator ~~Cranston~~ Alan

Thank you for your letter of July 24, 1985, concerning whether it is feasible to conduct a scientifically valid study of veterans who participated in nuclear weapons testing programs or who served in Hiroshima or Nagasaki, Japan, following World War II. I agree with you that the Office of Technology Assessment has done a commendable job in reviewing the Veterans Administration's proposed "Assessment of Veterans With Military Service at Sites of Temporarily Augmented Ionizing Radiation." I have asked the Chief Medical Director to review and comment upon the suggestion that the Veterans Administration undertake mortality studies of those veterans who participated in Shot Smokey or in Operation Crossroads. I will report to you the recommendations of the Chief Medical Director as soon as they become available.

Sincerely,

Harry

HARRY N. WALTERS
Administrator

Chairman **Murkowski**. Senator Mitchell, I believe you have a statement.

OPENING STATEMENT OF SENATOR MITCHELL

Senator **Mitchell**. I thank you, Mr. Chairman.

I would like to make a few extemporaneous comments.

Chairman **Murkowski**. Sure.

Senator **Mitchell**. First, I commend you, Mr. Chairman, for holding this hearing. I think it is important that this matter be pursued very vigorously, not only from the standpoint of the individual veterans and their families, but from the standpoint of our concept of what our society is.

This is not a perfect Nation, and just as the individuals who make up our society make mistakes, so also does our Government make mistakes.

The real test of any human society is not its infallibility because none is; rather, its willingness to acknowledge error, and, more importantly, once acknowledged, to correct that error.

That, I think, is what we are in the process of trying to do now, in a very difficult painful circumstance for all concerned.

In that process, the one standard to which we must adhere is an absolute, unswerving commitment to discover the truth of what occurred, whatever may be the effect on those individuals at the time.

And that, I think, is what this committee has been trying to do; that is what we must continue to do. In that regard, I note with some concern—I am sure all the members of this committee share it—the article in today's Washington Post, to which Senator Cranston alluded regarding aircrews being deliberately flown into atomic bomb clouds to measure radiation and the effect on the individuals.

I think we must be a part of the process by which the facts of that are discovered, exposed, and, to the extent to which they contribute to our search for the truth, be utilized.

In that regard, Mr. Chairman, I have just been advised that retired Lt. Col. Langdon Harrison, who was in a command position with respect to this test pattern, that is the flying of the crews in the A-bomb clouds, I would hope he would get a chance to appear.

If time does not permit because of the lateness of his appearance, I would request that in the further hearing that is scheduled that he be permitted to testify regarding his knowledge of it.

Chairman **Murkowski**. We would be very pleased to acknowledge him.

Senator **Mitchell**. Thank you.

Thank you very much, Mr. Chairman.

I think that this is a difficult area because of the sensitivity of the issue, the lack of knowledge, and the scientific uncertainty that existed then, and continues today, about the effects on human beings.

But I think we have an obligation, if we are to continue to be a society of decency and compassion, to make the fullest possible inquiry and to do what we can—and it will not be possible to make full compensation because, when people suffer this kind of injury, they cannot possibly be fully compensated—to make compensation as we can, to correct the errors of the past.

I thank you, Mr. Chairman.

Chairman **Murkowski**. Thank you very much.

I am going to call on Senator Warner, and then, I will call on Senator Rockefeller.

Senator Warner, we welcome you to the committee, and look forward to your statement.

OPENING STATEMENT OF SENATOR WARNER

Senator **Warner**. I appreciate that this hearing has been scheduled, at my request, by yourself and the distinguished ranking minority member.

This particular piece of legislation went to the Congress very expeditiously. In the first year, it failed to be enacted simply because of the inability of the two Houses to get together. So, it was on public notice that the U.S. Government desired to have this particular type of statute on the books.

The next year, I reintroduced it, as a matter of routine, at the recommendation of the Secretary of Energy. And, again, no one came forward to voice any opinion. It was completely public, and it was put on the books.

And, now, we are going to readdress the issues which led to this particular piece of legislation and the pros and cons.

My only regret is that this type of hearing, this type of interest by a variety of groups, was not brought to the attention of Congress early on in the consideration of this legislation.

And I hope that out of this hearing, whatever successive hearings may take place, the Congress can reach a proper and balanced decision.

Thank you, Mr. Chairman.

Chairman **Murkowski**. Thank you very much, Senator Warner. Senator Rockefeller.

OPENING STATEMENT OF SENATOR ROCKEFELLER

Senator **Rockefeller**. Thank you, Mr. Chairman. I will make some comments.

Obviously, this is a matter of deep frustration to all of us—there are so many uncertainties that stand in the way of reaching a consensus or what is fair for atomic veterans.

I feel that we owe the veterans every bit of attention. And I have to say that, as they get older, time begins to run out.

This is, after all, a process which cannot be repeated. The atomic veterans cannot wait much longer for answers from the Federal Government.

With respect to my State of West Virginia, there is a brave band of at least 100 members of the National Association of Atomic Veterans who are seeking recognition and compensation. They have held meetings aggressively and constantly, throughout the State, and are trying to band themselves together and keep their morale high.

The Atomic Veterans Relief Act is the chapter's top priority. In the words of the State coordinator of the organization, they seek "simple justice," and they believe that the legislation sponsored by Senator Simon and Congressman Evans will provide that.

Now, I want to listen to both sides. I think it is important that we have the second hearing—listen to some of the scientific research, see if that is helpful or not, simply obfuscatory, or what; but I would notice, and would ask that this be entered into the record, Mr. Chairman, a statistic or series of statistics that I received, I believe, via veterans' organizations from the Veterans' Administration. The document indicates that in a certain period of time, of those who filed claims for compensation for illnesses stemming from "A-tests," as it is referred to in the document, those whose claims were approved represented ½ of 1 percent out of over 3,000 claims—½ of 1 percent equals a total of 15 approved claims. My document says that 61 percent-plus of the claims were denied, and 38 percent-plus dropped out because of the finding that no health problems existed.

So that if I am to judge as we enter into these hearings, and perhaps a subsequent one, hopefully a subsequent one—if I am to judge our Government's response to radiation exposure claimed from victims, then I have to say that our response has been ½ of 1 percent, which is not to say the very least extravagant.

I look forward to these hearings, and I look forward to trying to be helpful to our atomic veterans.

And I thank the Chair.

Chairman MURKOWSKI. Thank you very much, Senator Rockefeller.

[The following statistics were supplied for the record:]

VETERANS' RADIATION EXPOSURE CLAIMS

[Sept. 3, 1985]

	Number	Percent
A. Total number of cases in study	5,194	100.0
Cases with diagnosis	3,083	59.4
Cases no diagnosis	2,111	40.6
B. Cases with diagnosis	3,083	100.0
Allowed	79	2.6
Denied	3,004	97.4
C. Total cases in study	5,194	100.0
Claimed A-test	3,050	58.7
Claimed other exposure	2,144	41.3
D. Those who claimed A-test	3,050	100.0
Allowed	15	0.5
Denied	[1] 1,871	61.3
No diagnosis	1,164	38.2
E. Those who claimed other exposure	[2] 2,144	100.0
Allowed	64	3.0
Denied	1,134	52.9
No diagnosis	946	44.1
In summary:		
Total cases	5,194	100.0
Allowed	79	1.5
Denied	3,005	57.9
No diagnosis	2,110	40.6

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[1] These 1,871 claims have the following 1,134 malignant diagnosis:
Histiocytic leukemia—3; Blood condition—5; Endocrine cancer—34; Myelocytic leukemia—29; Lymphocytic lymphoma—37; Skin cancer—159; Hairy cell leukemia—7; Hodgkin's disease—17; Brain tumor—44; Unspecified leukemia—38; Respiratory cancer—288; Melanoma—33; Lymphocytic leukemia—31; G.U. Cancer—145; Cancer, musculo-skeletal—49; Myelogneous leukemia—21; G.I. Cancer—192; Misc. sites—2.

[2] These 2,144 claims contain 825 Nagasaki and Hiroskhima claims consisting of leukemia and other malignancies 364; Misc. 286 and exposure only 175. None allowed.

Chairman Murkowski. I think it appropriate before I call on Representative Evans and Senator Simon that we reflect back to a very warm day—July 16—when the National Association of Atomic Veterans came to Washington. We were outside on the steps of the Capitol, and we listened to their expressed concerns over the effects of radiation.

Now, we reflect back on the realities that these incidents occurred in the 1950's. One could wonder why the Congress has not seen fit to address this issue previously; and, perhaps, someday we will know the reasons for that. But the realities are that Senator Warner has pursued this legislation When it was first brought to my attention, I advised the representatives of the National Association of Atomic Veterans that this committee would be responsive. I think it is evidenced by the action taken here today that we have been responsive, and, as a consequence, we can attempt to make excuses for the years that have gone by and recognize the difficulty of trying to evaluate facts, after so many years. The significant consideration here is that an attempt is being made to be responsive to these concerns, and, as a consequence, the testimony that will be coming out of this hearing, I am sure, will be useful.

I think it is interesting to point out one other thing. Unfortunately, the VA does not have a registry of those who have been exposed to ionizing radiation.

What I intend to do is to request the VA to initiate immediately the collection and the processing of health care claims and adjudication information to establish an ionizing radiation registry.

I think the purpose of that will enable the VA to collect and analyze data in advance of whatever recommendations come out of this hearing, and legislation, as proposed by Senator Warner and others, so that we can basically get moving on this and try and detect the disability trends that do exist among the atomic veterans.

This registry would be very similar to what the VA has already established in the area of the VA's Agent Orange Registry for Vietnam veterans. It is appropriate that the VA have this type of information for veterans exposed to ionizing radiation as well.

So that more or less brings you up to date on where we are and how we got there.

I would call on our witnesses at this time, and you may proceed under whatever your own individual time schedules are.

Senator Paul Simon from the State of Illinois, and the Honorable Lane Evans, from the State of Illinois, we welcome you. We look forward to your testimony.

Proceed at your discretion.

STATEMENT OF HON. PAUL SIMON, A U.S. SENATOR FROM THE STATE OF ILLINOIS

Senator Simon. Thank you very much, Mr. Chairman, and, if I may, because we are marking up in Judiciary right now, my colleague has generously suggested that I can go ahead first.

I would like to enter a statement in the record,[1] and then I want to commend you for having the hearing, for the point you just made on the registry. I want to commend Senator Warner for wanting to have a look at this thing, to see whether some mistakes have been made.

And I appreciate the leadership that my colleague, Lane Evans, has shown in the House on this thing.

It is very interesting, when we read about what went on—such as Senator Mitchell's reference to planes going through the mushroom clouds. It is called "Human Experiment Number 133."

Well, Human Experiment Number 133 and a lot of other things were done, not maliciously, not that anybody wanted to expose anyone to radiation, but it was done.

I became involved because from down in southern Illinois, Bob Farmer, whom you may be hearing from, contacted me. He was a young seaman, and was out in Eniwetok, the Marshall Islands, when they dropped the bomb. They did not have any radiation protective clothing or anything. They were told to "duck behind the truck," and he noticed as they ducked behind the truck that he could see, when the explosion went off, he could see the bones in his hands; he could see the skeleton frames of his buddies, just ahead of him, when the thing went off.

Then they went out, played in the water; they scrubbed down the ships right in the center of the radiation. No one suggested there was any problem.

Bob Farmer came back home, got married, had children—nine children, as a matter of fact. All of them appear to be perfectly normal. Then, Bob Farmer started having tumors; and of the nine children, let me just read this list to you:

As it turns out all nine have some genetic defect; and neither Bob Farmer nor his wife had any family history of genetic problems.

Robert Jr., 33 years old, was born with a lung deformity, which has almost killed him twice through hemorrhaging.

Diane, 32, was born with skull irregularities which bring on headaches severe enough at times to drive her to hospital emergency rooms.

Victoria, 30, was born with abdominal and heart deformities.

Patricia, 28, had an 8-pound, nonmalignant tumor removed 13 years ago.

Stephen, 22, was born with one knee joined to his torso, and without a hip or thigh bone. He was the only one that appeared to be abnormal at birth. He did not get his first artificial leg until he was a first-grader.

William, 21, was born with small cyst-like bumps all over his body, just beneath the skin.

Michael, 17, has an irregular heartbeat, and is developing the same sort of bumps as William.

Jeffrey, 15, finds an extra bone growing in his right leg.

Janet, 14, suffers from a serious breathing problem.

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[1] See p. 16.

Now, I just do not think we can walk away and say, "Sorry, this is your problem."

It is very interesting, we are now, perhaps even this week, going to approve a compact that the Defense Department has requested from us for the citizens of the Marshall Islands that includes compensation for radiogenic illnesses, and I am not opposed to that compact. All I am saying is that if we can do this for the citizens of the Marshall Islands, we ought to be able to do it for Robert Farmer, and for veterans who were ordered into these places; for people who were ordered in Human Experiment Number 133 to fly through those clouds.

Somehow, we ought to be able to respond, and what we are asking is simply that this be considered a service-connected disability. It just does not make sense that we not do that.

Now, the question is, why, if it is so clear, why does VA resist?

The answer is—and I understand the problems the VA has, the VA resists every suggestion for spending more money, for taking on additional responsibility; and particularly where you have the genetic problems that have been caused here, and I think fairly clearly caused by radiation.

So, I think we have a responsibility. Again, if we can do this for the people of the Marshall Islands, we ought to be able to do it for our own citizens.

And you cannot deny them every avenue—and I do not mean any disrespect for my good friend from Virginia, but, if we say, you cannot sue the Government; you cannot sue the private contractors; we are not going to give you any help; somehow that is not the right answer for these people.

We have to face it that we have a responsibility. We are not condemning anyone. No one knew at that point what radiation caused.

But if we can do it for the Marshall Islands people, we can do it for our own citizens.

That is the basic message.

I will be happy to answer any questions.

[Applause.]

Chairman **Murkowski**. Thank you, Senator Simon. We appreciate your statement, and the very moving account of the family. It is indeed a reflection on why we have not addressed this in the detail that we are prepared to go into at this time.

I would again ask the staff if they can reflect on just why we have not been more responsive to those veterans who were exposed, as you suggest, through no fault of their own, and really a lack of knowledge of the effects of radiation; and it is really an extraordinary event that probably knows no other parallel of recent warfare or experiments associated with that.

I would excuse, Senator Simon.

Senator **Simon**. Thank you very much.

[The prepared statement of Senator Simon follows:]

TESTIMONY OF
THE HONORABLE PAUL SIMON, U.S. SENATOR
BEFORE THE
COMMITTEE ON VETERANS AFFAIRS
THURSDAY, NOV. 14, 1985

MR. CHAIRMAN, I WANT TO THANK YOU AND THE MEMBERS OF THE COMMITTEE FOR THE OPPORTUNITY TO ADDRESS THIS IMPORTANT ISSUE. I ALSO WANT TO EXPRESS MY APPRECIATION FOR SENATOR WARNER'S WILLINGNESS TO REVIEW THE EFFECTS OF HIS LEGISLATION UPON ATOMIC VETERANS AND OTHERS. AS SENATOR WARNER AND HIS COMMITTEE KNOW, FAIR TREATMENT BY OUR GOVERNMENT HAS OFTEN ELUDED THESE SERVICEMEN BEFORE, AND MANY ARE NO LONGER ABLE TO TELL OF THEIR EXPERIENCES.

I AM ALSO PLEASED TO BE HERE WITH MY GOOD FRIEND AND COLLEAGUE CONGRESSMAN LANE EVANS WHO IS A STRONG ADVOCATE FOR ATOMIC VETERANS IN THE HOUSE. FORTY YEARS HAVE PASSED SINCE THE SANDS OF THE NEW MEXICO DESERT WERE TURNED TO GLASS BY THE INTENSE HEAT OF THE TRINITY DETONATION. WHILE SOME EFFECTS OF THAT TEST WERE IMMEDIATE AND VISUAL THERE WERE OTHER FORCES UNLEASHED OF WHICH WE DO NOT HAVE A COMPLETE UNDERSTANDING EVEN TODAY. WITH GREAT ANXIETY AND SOME FEAR OUR SCIENTISTS

SET OUT TO LEARN THE SECRETS OF THE NUCLEAR GENIE. WE HAVE COME TO A NEW REALITY SINCE THEN. TECHNICAL PROGRESS MAY YET PROVE TO BE SOMETHING LESS THAN THE ROAD TO SURVIVAL, BUT THEY ACHIEVED THEIR GOAL. WE ARE PROFICIENT IN THE CONSTRUCTION OF NUCLEAR WEAPONS, NUCLEAR POWER PLANTS AND IN THE APPLICATION OF NUCLEAR MEDICINE. THE MOMENTUM FOR THIS TECHNICAL PROGRESS CAME FROM THE ABOVE GROUND TESTS OF THE FIFTIES AND EARLY SIXTIES -- TESTS WHICH WE AND OTHER CONCERNED NATIONS CAME TO RECOGNIZE AS A THREAT TO THE ECOLOGICAL BALANCE OF THE WHOLE PLANET.

THE HISTORICAL PERSPECTIVE OF ANXIETY, FEAR AND THE INITIAL HASTE IN ACCOMPLISHING NUCLEAR RESEARCH IS KNOWN AND UNDERSTOOD BY ALL IN THIS ROOM AND INDEED BY ALL AMERICANS. WHAT WE SEEK TODAY IS ANOTHER KIND OF UNDERSTANDING. AN UNDERSTANDING THAT OF THE THOUSANDS WHO WERE A VITAL PART OF THE TESTS -- SOME ACTIVELY, SOME AS UNFORTUNATE BYSTANDERS AND AS IT TURNS OUT SOME AS HUMAN GUINEA PIGS -- AT LEAST SOME ARE ILL OR HAVE DIED BECAUSE THEY WERE UNFORTUNATE ENOUGH TO BE THERE. WE NEED THIS UNDERSTANDING FOR AT LEAST TWO REASONS. THE FIRST IS THAT SCIENCE HAS NOT YET DISCOVERED THE TOOLS TO GO FROM GENERALIZATIONS ABOUT THE WEAPON OF RADIATION EXPOSURE, TO CASE-BY-CASE DIAGNOSIS. THE SECOND IS THE NEED TO GIVE VETERANS AS COMPLETE AND SCIENTIFIC A RECORD AS WE CAN ABOUT THE PROCEDURES, POLICIES AND SAFEGUARDS THAT ATTENDED THESE

TESTS, SO THAT WE AND THEY CAN LEARN LESSONS FOR THE FUTURE. IN OUR PRESENT HANDLING OF THESE CASES WE ARE REDUCED TO DEALING IN MATHEMATICAL PROBABLITIES BASED ON INCOMPLETE AND IMPERFECT RECORDS. IF WE ACCEPT THE STATUS QUO WE ACCEPT THE CONTENTION THAT, FOR ALL PRACTICAL PURPOSES, EVERYTHING WAS DONE TO PERFECTION. WE UNDERSTOOD COMPLETELY THE CONSEQUENCES OF MARCHING TROOPS THROUGH GROUND ZERO IMMEDIATELY AFTER A DETONATION, OF WASHING RADIATION OFF TARGET SHIPS WITHOUT PROTECTIVE CLOTHING, OF LIVING IN THE ENVIRONMENTAL CHAOS OF EVAPORATED CITIES, OF CHILDREN PLAYING IN THE FALLOUT AS IF IT WAS SNOW. I DO NOT BELIEVE THAT ANYONE IN THIS ROOM THINKS THAT IS THE CASE.

ALL OF US IN THIS ROOM PROBABLY CAN ALSO AGREE THAT, UNDER THESE TROUBLING CIRCUMSTANCES AND IN FAIRNESS TO THESE VETERANS, THE BURDEN OF PROOF TO COMPLETE THE RECORD SHOULD LIE NOT WITH THE VICTIMS BUT WITH THE GOVERNMENT. THIS SENSE OF FAIRNESS IS ALREADY EXTENDED TO THE VICTIMS OF ATOMIC TESTS BY THE GOVERNMENTS OF CANADA, GREAT BRITAIN AND JAPAN, ALL OF WHOM AWARD COMPENSATION ON A PRESUMPTIVE BASIS.

REGRETTABLY, WE IN THE U.S. HAVE NOT BEEN AS FAIR WITH OUR ATOMIC VETERANS. LAST YEAR, WITH THE AMENDMENT WE ARE DISCUSSING, WE UNDERSCORED OUR ATOMIC VETERANS' SECOND CLASS CITIZENSHIP BY BARRING LAW SUITS AGAINST THE GOVERNMENT AND

DEFENSE CONTRACTORS INVOLVED IN NUCLEAR TESTING. HOW IRONIC THAT WE WERE RECENTLY ENGAGED IN OFFERING THE PROTECTION OF OUR COURTS TO A SOVIET SEAMAN AND WE DENY THAT SAME PROTECTION TO OUR VETERANS.

THIS COMMITTEE LAST YEAR OVERSAW SOME MOVEMENT TOWARD JUSTICE FOR THESE VETERANS. BUT THE CURRENT MECHANISM REMAINS BURDENSOME, AND MOST DESERVING VETERANS WILL NOT BE HELPED BY IT. I COMMEND TO THE COMMITTEE'S ATTENTION A FAIR AND LIMITED COMPENSATION PLAN I HAVE INTRODUCED TO PROVIDE FOR TREATMENT OF VETERNS INVOLVED IN THE EARLY TESTS. I ALSO INTEND TO OFFER LEGISLATION TO REPEAL THE PROVISIONS OF LAST YEAR'S AMENDMENT.

THANK YOU.

Chairman MURKOWSKI. I would next call on our next witness, the Honorable Lane Evans, a Representative from the State of Illinois. We wish you a good morning, and look forward to your testimony.

STATEMENT OF HON. LANE EVANS, A U.S. REPRESENTATIVE FROM THE STATE OF ILLINOIS

Mr. EVANS. Thank you, Mr. Chairman.

I express my thanks to you and to the ranking member of the committee, Senator Cranston, and the other committee members, for giving me an opportunity to speak before the committee today.

And it is always a pleasure to appear here with Paul Simon, particularly when we talk about atomic veterans, an issue that we had worked together on, and an issue on which Paul has played a leading role.

Besides serving on the House Veterans' Affairs Committee, and being chairman of the Vietnam-era Veterans in Congress, a good reason for being interested in this subject, as Senator Cranston indicated, my father is an atomic veteran.

Too young to serve in World War II, he enlisted in the Navy, after his high school graduation. The high point of his tour of duty was the time he spent on ship at the Bikini Atoll during the Operation Crossroads atomic testings.

He was proud of his service to our country, and he loved showing me his Operation Crossroads photobook, when I was a child. I keep that book in my Washington office today as a Congressman.

This past weekend I spoke at the annual convention of the National Association of Atomic Veterans. In that speech, I talked about being the son of an atomic veteran, and about the need to enact legislation to provide relief to those veterans, and their families, who are suffering from the effects of radiation-related diseases and conditions.

Senator Simon and I joined together to introduce such legislation in both Houses in Congress, and I would urge this committee to review that bill closely.

The Atomic Veterans' Relief Act is based on the simple notion that if you or your family are suffering from radiation-related illnesses, and you were present at an atomic testing or cleanup, then you are entitled to Government help.

It shifts the burden from the veterans to the VA, where it rightfully belongs.

In July of this year, the Veterans' Affairs Committee, on the House side, held hearings on the Atomic Veterans' Relief Act. The General Counsel of the VA appeared at that hearing to say that our bill would cost more than $23 billion, a figure that we were all certainly shocked to hear.

Later, we learned that the VA based its figures on compensating every member of the military in the post-atomic era, since we have all been exposed to some degree of atomic radiation.

While it may be true that natural sunlight does expose us all, to some degree of radiation, it is equally clear that this is not what we are talking about in this legislation.

The VA has made a distortion, an inexcusable distortion of this legislation. What we are seeking is not excessive or unreasonable.

What we are talking about are some 250,000 servicemen who participated in 235 tests carried out between 1946 and 1962, and occupation forces at Hiroshima and Nagasaki shortly after the war.

We are asking for simple justice for the brave men and women who served this country in good faith, but whose faith is being betrayed.

While we on the Hill all recognize the comprehensive legislative remedies often take time, the Warner Amendment has effectively closed off other means for veterans seeking redress.

The measure protects Federal contractors from claims arising out of atomic weapon testing programs. It states that the Federal Government should be substituted for the private contractors in those cases.

We now arrive at catch-22 because the Feres Doctrine prohibits servicemen from suing for injuries that arise out of the course of their service.

Therefore, atomic veterans are being denied the right to pursue any claim in the U.S. courts whatsoever, so I am pleased to hear that Senator Simon will introduce legislation to repeal the amendment. Similar legislation has already been introduced in the House of Representatives by Congressman Boucher of Virginia.

The Judiciary Committee has held hearings on it, and I hope that will receive expedited action.

We who are members of the generation of the Vietnam-era veterans recognize that our fate is linked to the fate of atomic veterans and all veterans who have served their country.

Each generation of servicemen and servicewomen has its "atomic veterans." In World War I, it was those who were exposed to mustard gas. For my generation, it is called "Agent Orange." Just as with atomic veterans, our Government has been slow to fulfill its obligations to the servicemen and their families affected by this deadly herbicide.

In the last Congress, we passed some legislation that opened the door. In certain diseases related to dioxin exposure, Vietnam veterans are now entitled to service-connected compensation, and the burden of the proof is on the VA where it belongs.

The Agent Orange bill did some door-opening for atomic veterans also. It added a number of radiation-related diseases to those that qualified as service-connected; but it did not make them presumptive, meaning that the VA still retains the discretion about whether to grant benefits to any individual atomic veteran.

With a record of turning down more than 99 percent of the claims made to date, I have no high hopes about this particular bill.

No group has been more penalized by the travesty of bureaucratic resistance than atomic veterans. The Government's unfair and arbitrary decision to deny practically all claims for service-connected compensation and disability is literally beyond appeal.

By what logic can our Government ask its citizens to fight and die for constitutional freedoms, when those freedoms are denied those who answer the call.

Each day of delay adds to this travesty. If we stall long enough, the problem—that is, the atomic veterans—will indeed disappear.

But I do not think waiting for veterans to disappear is what Abraham Lincoln had in mind when he spoke of caring for those who had borne the battle.

So, I urge the committee to consider a lot of different legislative approaches, and I appreciate your time today.

[Applause.]

Chairman MURKOWSKI. We thank you for your testimony, and excuse you.

Our next witness will be Lt. Col. James Dennis, from Alexandria, VA, a very highly decorated veteran.

Colonel Dennis, we welcome you to the committee. It is indeed a pleasure to have you with us, and we look forward to your testimony.

Please proceed at your convenience.

Colonel DENNIS. Thank you, Mr. Chairman.

Senator SPECTER. Mr. Chairman——

Chairman MURKOWSKI. I am sorry. Excuse me for just a moment. I overlooked two of my colleagues that have just come in. If you will bear with me, and I do apologize, Senator Specter, I am used to looking into the light on this side.

OPENING STATEMENT OF SENATOR SPECTER

Senator SPECTER. Thank you very much, Mr. Chairman.

I appreciate the recognition. I just want to commend the Chair for holding these hearings. We are in the middle of Judiciary Exec, so I must return there, but I would just like leave to submit certain questions for the record.

Chairman MURKOWSKI. You certainly may, and they will be entered in the record.[1]

Senator Denton, I have also overlooked you, and I do apologize. I occasionally overlook some of my colleagues on the other side, but this time I overlooked my own, and I do apologize.

OPENING STATEMENT OF SENATOR DENTON

Senator DENTON. Well, that is indeed an exceptional overlooking on your part, Mr. Chairman. You are always courteous, and there is no apology necessary.

I just want to state, Mr. Chairman, that I am pleased to hear the testimony of atomic veterans this morning, veterans who may have been exposed to ionizing radiation while on active duty with the Armed Forces of the United States.

I admit that, with respect to Agent Orange, I first had an oversimplistic view of the difficulty of establishing whether there was indeed harm. I have since changed my attitude and have changed my voting on the subject.

I am openminded on this one. I have the belief that Senator Warner, who will speak for himself, did not intend to rule out a proper approach to this. He believed rather, for reasons that I think that he will explain, that if contractors and so on who were engaged in atomic testing believed that they incurred a certain amount of liability because of that, then they could make a contribution, for example, to determine who suffered and who did not suffer, as a result of the tests. But that is for him to express.

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[1] See p. 337.

I certainly want to let it be clear that I am in favor of taking every reasonable step to recompense and care for our veterans who had the terribly unfortunate experience of harmful exposure to ionizing radiation. I am not going to take any simplistic approach. The last thing that is in my mind is to save money. These gentlemen and ladies who might have been exposed to radiation deserve our primary consideration, and I hope that everyone on the committee concurs, and I expect that they do.

The Senate recognizes the atomic veterans and gives them a priority for disability compensation because of their unique situation. If that statement is not correct because of the Warner amendment, then we should change it. I certainly concur in the recognition that we give the atomic veterans I and want to listen to their complaints about the present situation very carefully.

I just came from an Armed Services Committee meeting, where we were looking at the entire reorganization of the Department of Defense and its changing goals, roles, and missions. Otherwise, I would have been here at the very beginning.

And I just want to express my interest in the matter, my sympathy with those who may have suffered, and my determination to ensure that we do everything we can to compensate for that.

Thank you, Mr. Chairman.

Chairman **Murkowski**. Thank you very much, Senator Denton.

My colleague, Senator Warner, would like to recognize Colonel Dennis' very significant service record, of which I have had the pleasure of reading.

Please proceed.

Senator **Warner**. Mr. Chairman, I think the witness, Colonel Dennis is probably too modest to recount his personal history of service to the United States.

He has held every rank from private to colonel, twice awarded the Nation's second highest combat award, the Distinguished Service Cross; five times the third highest, the Silver Star; and the Purple Heart four times.

He comes from the State of Virginia. We have had an opportunity to speak together, and I have looked through your testimony, which is a very valuable contribution to the resolution of this tough issue.

Colonel **Dennis**. Thank you, Senator Warner, and Mr. Chairman.

Chairman **Murkowski**. Please proceed, Colonel Dennis.

Colonel **Dennis**. I can cut down some now.

Chairman **Murkowski**. No; please proceed with your statement.

STATEMENT OF LT. COL. JAMES A. DENNIS, U.S. ARMY (RET.), ALEXANDRIA, VA, A HIGHLY DECORATED VETERAN

Colonel **Dennis**. I am a veteran of 21 years' active Army service. I enlisted in the U.S. Army at 16 years of age, after I finished high school in central Virginia.

I became a paratroop infantryman, after I was commissioned, fighting two combat tours in both the World War II and the

Korean war. I was wounded four times, fighting in both the European and Pacific Theaters in World War II, and in the Korean war.

As Senator Warner mentioned, I am proud of it. I went through all of the ranks from private to colonel, and I was twice awarded the Distinguished Service Cross, once by General Patton; the Silver Star five times; the Purple Heart four times; the Combat Infantry Badge two times; and the Master Parachutist Badge.

On March 22, 1955, in the Nevada Desert, I participated in atomic test shot BEE, the detonation of an atomic bomb emplaced on a 500-foot tower. Three hundred other Army personnel and I were in a trench 3,500 yards from the atomic explosion.

After the explosion, we were told to stand, turn around and observe the atomic cloud. As we turned, we were hit in the face by radioactive fallout, as the wind had shifted. This caused us to be covered with a sooty radioactive residue.

This dust became embedded in our uniforms and upon our face and head, and entire body. In my opinion, we obviously inhaled and ingested radioactive dust.

When I looked at the atomic cloud, I had had considerable experience with chemical explosives, and I knew how a detonation should look, even for a nuclear detonation, although I had not seen one before.

I knew that—I thought that a faulty detonation had occurred, as the tower was not completely destroyed. A bad detonation, I found out later, produced only one-half of the predicted nuclear yield, so that the BEE shot was one of the most radioactive, dirty atomic detonations of the U.S. atomic test series.

Thirty minutes after the detonation, we walked to 700 yards from ground zero where we assessed equipment damage for 3 hours. None of us were equipped with film badges to measure penetrating gamma radiation. Nor was anyone that I saw—and I was a battalion commander—measuring gamma radiation with a Geiger counter.

More importantly, I feel, no one was measuring the alpha and beta radiation levels, which are the most lethal radiation that is inhaled and ingested. I have no doubt that we received large doses of internal radiation, alpha and beta emitters—such as strontium 90 and plutonium.

We had to wear the same clothes that we had on the next day while participating in atomic shot ESS. We also were unable to take showers when we arrived back at Camp Desert Rock.

On March 23, 1955, I participated in test shot ESS, an atomic bomb detonated 67 feet underground. I, and 356 other personnel, observed the test in the open, about 9,000 yards from ground zero.

The atomic explosion produced a massive cloud of radioactive soil and dust which drifted over us being winddriven toward eastern Nevada and west-southwestern Utah.

As with the BEE shot, the detonation contaminated us all with radioactive fallout. Again, we had no protective clothing or equipment; nor was anyone equipped with film badges.

There was no monitoring of the penetrating gamma radiation or alpha/beta radiation, which we no doubt inhaled and ingested. Again, we were unable to shower.

Now, I returned home after those two tests, and I heard nothing more about it. When I arrived home, I was sick. I could not go to work the next day. I had nausea, fever, headache, diarrhea, dizziness; and I was hospitalized again for the same symptoms June 1955 while at Fort Bliss, TX, and again in July 1955 at Fort Belvoir, VA. I have had these same sicknesses frequently since March 1955.

I have had those sicknesses ever since then, the same symptoms up to diagnose of my cancers and since having incurred blood cancer and bone marrow cancer.

After having been exposed to unknown levels of radiation, both external and internal radiation, in the atomic tests, in 1962, I was required to perform demolition of the accidentally exploded SL–1 nuclear reactor at Idaho Falls, during the period, or the days of March 12, 26, and 27, 1962.

The SL–1 Reactor exploded. It was a meltdown, a neutron fission, runaway chain reaction that occurred on January 3, 1961, killing three military personnel.

The Government loaned me, a demolition technician to the General Electric Co., the contractor, to perform explosive cutting and dropping of the highly radioactive nuclear reactor, what remained of it. GE did not protect me from hazards of radiation.

I was contaminated in the face, nose, and mouth by strontium 90 radioactive dust, which contaminated my bone marrow. General Electric failed to protect me from both internal and external radiation. They gave me no safety instructions nor training, and did not protect me with the proper equipment they had on hand and which they had previously used to protect General Electric personnel. I was sacrificed to maintain General Electric's contract schedule.

February 1977, 15 years and 11 months after my last exposure to radiation on the SL–1 nuclear reactor, I was severely stricken with bone pain, body aches, fatigue, low blood counts, falling episodes, mouth, gum, nose, and eye bleeding, and I have now gone blind in my right eye, and was finally diagnosed as having blood cancer and bone marrow cancer in January 1978, after I had almost bled to death in my sleep from hyperviscosity cancer-induced hemorrhage.

From January 1978 to July 1979, I was kept alive by undergoing plasma exchanges, which is the removal of four liters of plasma, taking about 5 hours, to reduce my blood viscosity and my IGM levels, to stop internal and external hemorrhages. I had to do this every 2 days until the chemotherapy began to obtain some control over my blood- forming mechanism, the bone marrow.

I have almost died 18 times from effects of blood and bone marrow cancers, and the dangerous reactions of chemotherapy, plasma exchanges, blood transfusions, and medications.

I have had emergency life-threatening surgery in 1983 and 1984, and have endured constant body ache, bone pain, bleeding, fatigue, blackouts, falling episodes, severe weakness, extremely low blood count levels, making me highly susceptible to infection, stroke, heart attack, coma, et cetera.

I am now dying of radiation-induced blood cancer and bone marrow cancer. My cancers are incurable, and I am totally and permanently disabled for life, expected to lead to early death. Terminal cancer induced bleeding has blinded me in my right eye.

I have been unable to work since July 1981. I feel that this was caused by my participation in the radiation exposures in the service as prominent treating physicians have said in sworn depositions.

Now, the latency period for development of radiation-induced cancers—and I have read this, is 16 years for a 39-year-old man, the age I was when I was exposed on the SL-1 Reactor in March 1962. My blood and bone marrow cancers were diagnosed in January 1978, 15 years, 11 months from my last radiation exposure.

I think you all probably know that nuclear physics textbooks cite ionizing radiation as a prime cause of cancer. I have here an AEC and DOD textbook, The Effects of Nuclear Weapons, which was first published in the Fifties, and then was published again in 1962, republished in 1964, and the Army has a pamphlet, 50-3, the same textbook which was published in 1977, entitled The Effects of Nuclear Weapons.

In Chapter XI, "Effects on Personnel," this book, which is signed by Atomic Energy Commission Chairman Seborg and Secretary of Defense McNamara, describes my blood cancer and bone marrow cancer effects as "radiation induced" in almost the same words as Army Colonel Charles F. Miller, M.D., described it in his medical records on me.

Dr. Miller is the Army doctor who saved my life.

I have these books; yet I have seen in court, and in the denial of my veterans claims, Justice Department and the Department of Energy attorneys, scientists, physicians, and their expert witnesses continue to ignore their own publications and testify otherwise that most everything but radiation causes cancer.

NIH has a pamphlet that they distribute worldwide that states "radiation causes cancer." But I think the most important thing, that some of the most prominent nuclear specialists, doctors—Dr. Karl Z. Morgan, Dr. Alice M. Stewart, Dr. Ernest Sternglass, Dr. Charles Miller, my Army doctor that saved my life, Dr. Richard L. Humphrey of Johns Hopkins Oncology Center—have all stated in sworn depositions that, based on my radiation exposure, that they consider the probability to be 99.9 percent that my blood and bone marrow cancers were caused by excessive radiation.

Now, I only have—I will just finish, sir. I applied for and was denied VA benefits and medical benefits and compensation in 1978 and 1979. I was denied those again in 1980.

In February 1980, I appealed to the VA Board of Appeals the denial of health care benefits and compensation for my cancer, but the VA Board of Appeals denied entitlement to service connection.

February 1985 I again applied for VA benefits based on sworn depositions of four prominent cancer specialists that have kept me alive over the last 7½ years. I have heard nothing from the VA other than their notice of receipt of my claim even though I provided new medical and scientific evidence attesting my cancers being radiation induced.

Mr. Chairman, and members of the committee, I thank you very much for permitting me to testify.

Chairman **Murkowski**. Thank you, Colonel Dennis. That is certainly an extraordinary account.

[The prepared statement of Colonel Dennis follows:]

STATEMENT OF JAMES A, DENNIS, ATOMIC VETERAN
BEFORE THE UNITED STATES SENATE
COMMITTEE ON VETERANS' AFFAIRS

Mr. Chairman and Members of the United States Senate Committee on Veterans' Affairs:

A professionaal soldier for 21 years active Army service, I enlisted in the US Army at 16 years old in 1939 after finishing High School in Central Virginia. I loved the Army from the start and by Summer 1941 I had advanced through the ranks to become one of the Army's youngest First Sergeants. Commissioned a Lieutenant in early 1942, I became a paratroop Infantryman fighting two combat tours in both World War II and the Korean War. I was wounded four times, once during combat in North Africa and again during the Sicily campaign. After returning to the States, I volunteered for further combat duty and was sent to the Pacific joining the 11th Airborne Division. I was wounded a third time fighting the Japanese Army in the Philippines. I was wounded a fourth time during my second combat tour in the Korean War. Having held every rank from Private to Colonel in combat units, I was twice awarded the Distinguished Service Cross, the Silver Star five times, the Purple Heart four times, the Combat Infantryman Badge twice, and the Master Parachutist.

On March 22,1955 at 0505 hours in the cold Nevada Desert, I participated in Atomic Test Shot BEE, the detonation of a new type atomic bomb emplaced on a 500 foot tower. Three hundred other Army personnel and I were seated backs to the blast in a hip deep trench 3500 yards from the atomic explosion. Instructions as to our actions were transmitted to us over a blast resistant speaker because Camp Desert Rock personnel directing the test were observing the blast from inside a concrete bunker seven miles away with Generals and other important observers. With eyes closed as told, on detonation of the atomic bomb, I saw the brightest light of my life from the nuclear fireball. We were told to stand immediately, turn around and observe the atomic cloud. As we turned we were hit in the face by radioactive fallout as the wind had shifted, covering us all with a thick,black, sooty radioactive dust. This radioactive sooty dust became embedded in our uniforms and upon our faces and head. We obviously inhaled and ingested the radioactive soot and dust as it covered our faces making us look like coal miners.

When I looked at the atomic cloud, I knew that a faulty detonation had occurred as the tower was not completely destroyed leaving about one-half of it bent but still standing. Because the bad detonation produced only 8.1 kilotons of the predicted 15 kilotons nuclear yield, the BEE Shot was one of the most radioactive dirty atomic detonations of all US atomic tests.

Thirty minutes after the atomic detonation, I and the other 300 personnel walked to 700 yards from ground zero where we assessed equipment damage for three hours. No Nevada test personnel were present to prevent our going to ground zero or knowing if we did as only white tape on mesquite bushes marked the 700 yard radii. Neither I nor any of the other 300 personnel were equipped with film badges to measure penetrating gama radiation. No one was measuring gama radiation with a Geiger counter. More importantly, no one was measuring the alpha and beta radiation levels which are the most lethal internal radiation that is inhaled into the nose and ingested into the mouth. I have no doubt that I and the others received large dosages of internal radiation, alpha and beta emitters, of Strontium 90, Cesium 137, Americium 241, and Plutonium radionuclides. We had to wear these same clothes the next day while participating in atomic shot ESS on March 23,1955. Moreover, we were unable to take showers because shower facilities at Camp Desert Rock had been destroyed by windstorms.

On March 23,1955 I participated in atomic test shot ESS, an atomic bomb detonated 67 feet underground. I and 356 other personnel observed the test of the Army's Atomic Demolition Munition (ADM) in the open, not in trenches, about 9000 yards from ground zero. Because of high winds with frequent directional changes, the atomic detonation scheduled for 0500 hours was not detonated until 1230 hours. Detonated underground to contaminate large areas with radioactive fallout as a military defensive barrier, the atomic explosion produced a massive cloud of radioactive soil and dust which drifted over us being windblown toward eastern Nevada and west-southwestern Utah ranches. The radioactive cloud being wind-driven continued to increase horizontally and vertically. It had to have settled onto many square miles of land and ranches. As with the BEE atomic shot, the detonation contaminated us all with radioactive dusty fallout. Again we had no protective clothing or equipment, especially respirators, nor was anyone equipped with film badges. No Desert Rock personnel monitored either penetrating gama radiation or alpha/beta emitter internal radiation. Again, shower facilities were not available at Camp Desert Rock after our three hour return bus trip.

After exposure to unknown radiation levels in two atomic tests, I was again exposed to external and internal radiation when I inhaled and ingested Strontium 90, Cessium 137, and Plutonium radioactive dust when required to perform demolition of the accidently exploded SL-1 Nuclear Reactor at Idaho Falls, Idaho, March 12-27,1962. The SL-1 Nuclear Reactor exploded (meltdown) January 5,1961, killing three military personnel. The US Government loaned me,an explosive demolition technician, to General Electric Company, the contractor, for me to perform explosive cutting and dropping of the highly radioactive SL-1 Nuclear Reactor. I accomplished the explosive demolition of the Reactor in record time, but was contaminated in the face, nose and mouth by Strontium 90 radioactive dust which contaminated my bone marrow. General Electric willingly and negligently failed to protect me from both internal and external radiation. They gave me no radiation safety instructions nor training, and did not protect me with the proper equipment they had on hand and had previously used to protect General Electric workers.

February 1977, fifteen years, 11 months after my last exposure to external and internal radiation, I was severely stricken with bone pain, body aches, fatigue, low blood counts, falling episodes, mouth, gum, nose and eye bleeding that was finally diagnosed as blood cancer and bone marrow cancer in January 1978 after I had almost bled to death in my sleep from hyperviscosity cancer-induced hemorrhage. From January 1978 to July 1979 I was kept alive by undergoing plasma exchanges (removal of 4 liters of plasma to reduce blood viscosity and IGM levels to stop external hemorrhages) every two days until chemotherapy began to obtain some control of my blood forming system (bone marrow). I have almost died 18 times from effects of blood and bone marrow cancer and the dangerous reactions of chemotherapy. I have had emergency life threatening surgery in 1983 and 1984 and have endured constant body ache, bone pain, extremely low blood count levels making me highly susceptible to infection, stroke, heart attack, coma, etc. I am now dying of radiation-induced blood cancer and bone marrow cancer. My cancers are incurable, and I am totally and permanently disable for life expected to lead to early death. Wanton and willful negligence in failing to protect me from nuclear radiation in Atomic tests and my explosive demolition of the SL-1 reactor is taking my life.

I have nothing to look forward to but death for my 43 years of loyal, dedicated service to the US Government.

The latency period for development of radiation induced cancer is 16 years for a 39 year old man, the age I was on my last radiation exposure of March 1962. My blood and bone marrow cancers were diagnosed in January 1978, 15 years, 11 months from my last radiation exposure. Any nuclear physics textbook and many physics texts cite ionizing radiation as a prime cause of cancer. The AEC and DOD Textbooks, The Effects of Nuclear Weapons, April 1962, Chapter XI, "Effects on Personnel", describes my blood cancer and bone marrow cancer effects as radiation induced in almost the same words as Army Colonel Charles F. Miller, Jr., M.D. (who saved my life in 1978 and 1979 and first diagnosed my cancer) described its effect on me. I have these books, yet Justice Department and Department of Energy attorneys, scientists, physicians, and their puppet paid experts continue to ignore their own publications. Department of the Army Pamphlet No. 50-3, The Effects of Nuclear Weapons, March 1977 is a reprint of the AEC and DOD text and contains the same data on radiation induced cancer. Moreover, NIH has a pamphlet distributed worldwide that states "radiation causes cancer". Madame Curie died in 1934 of anemia (low red blood cells and hemoglobulin) caused by handling of the radium she had discovered. Today anemia is called aplastic anemia which is cancer of the blood (low red blood cells) caused by the bone marrow not making enough red blood cells and other blood elements. This is one of the cancers I have. Finally Dr. Karl Z. Morgan, Dr. Alice M. Stewart, Dr. Ernest J. Sternglass, Dr. Charles F. Miller, Jr., Colonel, MC, US Army, Dr. Richard L. Humphrey, have all stated in sworn depositions that in their considered medical opinion, based on my radiation exposures the probability is 99.9 percent that my blood and bone marrow cancers were caused by excessive external and internal radiation.

I applied for and was denied VA disability compensation and medical benefits for radiation induced cancer in 1978. In 1979, based on additional medical evidence showing causal relationship between atomic bomb test radiation and my blood and bone marrow cancers, I again applied for and was denied VA disability compensation. February 1980 I appealed the VA denial of health care benefits and compensation for my cancer, but the VA Board of Appeals denied entitlement to service connection saying my blood and bone marrow cancers were neither incurred in nor aggravated by service. February 1985 I again applied for VA compensation and medical benefits based on sworn depositions of four prominent medical doctors specializing in hematology/oncology who had treated me. I also provided VA with six medical research studies showing bone marrow cancer was the number two cause of death among Hanford, Washington atomic bomb radiation workers from 1943 to 1981. I have heard nothing from the VA other than their notice of receipt of my claim. Medical treatments of my blood and bone marrow cancers are denied by VA because these terminal cancers are said by VA to be not service connected.

Mr. Chairman and Members of the United States Senate Committee on Veterans' Affairs, I thank you for permitting me to testify.

Chairman MURKOWSKI. I am wondering if you have any recollection of what reason the VA used in denying your previous claims?

Colonel DENNIS. The only thing that I have are the records of the VA Board of Appeals and the letters which says, state that "based on the records that my cancer was neither incurred in nor aggravated by military service."

Chairman MURKOWSKI. Your medical costs up to date have been met by what source, sir?

Colonel DENNIS. Sir, I have—being a retired military, I have medical benefits through the military, and I had been going to Walter Reed; but I can no longer get plasma exchanges there. So, I started going to Johns Hopkins Oncology Center, and I go to the University of Virginia Medical Center.

The first couple of years my medical costs were all paid for by the Department of Defense, but last year because of my increased severity of my cancers, and not being able to get treatment at the military hospitals, I had to spend $17,700 last year, and the year before, $23,000 of my own money, which are my wife's and my life savings; and my home is not paid for; and I am almost out of life savings.

I did get a retirement from the Service, sir, but I waived that in order to get tax free VA disability compensation, I cannot be paid both.

Chairman MURKOWSKI. Would you have any recollection of why Walter Reed refused to continue your transfusions?

Colonel DENNIS. Sir, they did not refuse it. The lady that ran the plasma exchange machine retired and she had trained another lady, and when Mrs. Milan, who helped save my life, left, Walter Reed Army Medical Center [WRAMC] decided they would no longer do plasma exchanges. WRAMS is supposed to be the most professional hospital for all military services, to send their undiagnosed sick to, yet they do not do plasma exchanges—disgraceful.

If my viscosity gets high and I begin to hemorrhage—and I did just this past week—then I have to go somewhere where I can get the plasma exchanges.

Chairman MURKOWSKI. And your information is that Walter Reed does not provide that any more?

Colonel DENNIS. Sir, I went down to the blood lab, which is in charge of it, and personally checked on it.

Chairman MURKOWSKI. The VA Hospitals do not provide this?

Colonel DENNIS. I do not think the VA Hospital does this, I was told they did not have the capability.

Chairman MURKOWSKI. Have you approached the VA and requested to see if they can provide this kind of care?

Colonel DENNIS. Sir, I have been denied treatment for my cancer, because it is not service-connected. The VA has said that my cancer was not service-connected, but I do not believe it.

Chairman MURKOWSKI. You are eligible for VA care, as a veteran. The question, of course, is certainly a very real one. The reason they have denied evidently is because of their contention that it was not service-connected, but I would like to do this, on behalf of the committee is direct an inquiry to Walter Reed and to the VA as to why you are not eligible for the current type of treatment that you have as, one, a veteran, in the VA, or, furthermore, through the Department of Defense, Walter Reed Hospital.

I intend to ask the VA that question as well. Is there anybody from the VA that is in the audience that might respond to the concerns expressed by the Chair?

Dr. HOBSON. Excuse me. I do not know whether the Colonel has applied for hospitalization——

Chairman MURKOWSKI. Would you identify yourself, please? Dr. Hobson?

Dr. HOBSON. Dr. Hobson.

Chairman MURKOWSKI. Of the Veterans' Administration.

Dr. HOBSON. Veterans' Administration Department of Medicine and Surgery.

I do not know whether the Colonel has applied to a Veterans' medical installation for care. If he has, he would be entitled to care, even though that does not qualify him in any way for compensation. I do not know whether he is qualified for that or not.

But he would be qualified for care, and he need only apply.

Colonel DENNIS. Mr. Chairman? May I respond to that?

Chairman MURKOWSKI. Excuse me. You may respond, and, of course, it is an obvious one. Have you applied?

Colonel DENNIS. Sir, I have been receiving treatment at the Washington Hospital Center for my head wound since 1967 and I received treatment there for this combat injury, but I was even denied 3 years ago a hypertensive screening when I had hypertensive heart disease; and they told me to go to Walter Reed. I have been denied medical treatment for my blood and bone marrow cancers.

But I have asked about benefits at the VA. I do not believe—I am not positive of this, sir—but I do not believe that they have plasma exchange facilities there.

Chairman MURKOWSKI. Well, I think when we talk about benefits and talk about treatment, there is a difference, and I am sure you are aware of it. In order to expedite the process, we will make an inquiry of both the VA and Walter Reed as to why they either have terminated or no longer provide the particular type of care you need, and we will also clarify the question of treatment, because we recognize the realities associated with the benefits.

Senator Rockefeller.

Senator ROCKEFELLER. Mr. Chairman, just on that precise point, I would ask this to the witness. The testimony of this day of the Chief Benefits Director of the Veterans 'Administration has this statement in it:

> Under the terms of Public Law Number 97-72, any veteran alleging exposure to ionizing radiation through participation in the testing of a nuclear device, or through service in Hiroshima or Nagasaki, during the occupation, who needs hospital, outpatient, or nursing home care, for any condition possibly related to radiation exposure, is eligible for medical care without having to certify inability to defray the cost of care.

Now, that is the law as it is, Colonel Dennis, as I understand it.

Colonel DENNIS. Yes, sir.

Senator ROCKEFELLER. And I would—it would appear to me that that would make you eligible without question for health benefits which you have as yet not able to receive.

Colonel DENNIS. I understand, sir.

Senator ROCKEFELLER. I refer to the testimony submitted today by the Chief Benefits Director of the Veterans' Administration, to make this comment. Mr. Chairman, I would ask for the record that we be provided clarification on the discrepancy between what the witness, Colonel Dennis is saying and the testimony that the Chief Benefits Director has given today.

Chairman MURKOWSKI. I would defer to Dr. Hobson, to see if he can enlighten us specifically. I am not going to defer too much from the formal hearing process, but I think that if we can expedite, it would be helpful, and take advantage of the talents that we have.

Please proceed, Doctor, can you indicate again, does the VA have a plasma exchange capability?

Dr. HOBSON. I am sorry. I do not know that. I do know that he would be eligible for care such as we had available to anyone.

Chairman MURKOWSKI. Before the day is concluded, Colonel Dennis, the committee will make the inquiries on your behalf, and advise you in writing to the best of our current assessment the extent of your qualifications for continued exchange of plasma at Walter Reed, and of the issue of VA availability of care and eligibility; and we will be in contact with Dr. Hobson today, and we will have a response to you prior to the end of the day, sir.

Colonel DENNIS. Thank you very much, sir.

Senator CRANSTON. May I ask a question?

Chairman MURKOWSKI. Surely.

Senator CRANSTON. Colonel, have you ever sought care for your cancer at any VA Hospital and been turned down?

Colonel DENNIS. Yes I have on several occasions. I was turned down for cancer treatment because the Washington Veterans' Hospital personnel said my cancer had not been found to be service-connected. What you get at the working level and what you get higher up are two different things. The VA is still not providing medical treatment to veterans with cancer unless they have been awarded service-connection for cancer.

And, yes; I have. In—several times. Now, I was sent over there twice this year for an examination. I was, as I told you, Senator Cranston, I was wounded, and I have just been, after 19 years, awarded a 100 percent disability, but it is all for my combat injuries of World War II and the Korean War and not for radiation-induced cancers.

Senator CRANSTON. Apart from disability compensation, have you sought medical care at a VA Hospital and been turned down; and, if so, specifically, what hospital.

Colonel DENNIS. It was the Washington Veterans' Hospital Center, sir. They turned me down for cancer treatments during 1985 saying my cancers were not service-connected.

Senator CRANSTON. Was that——

Colonel DENNIS. The Veterans' hospital over at 50 Irving Street.

Senator CRANSTON. Were you seeking medical care for your cancer condition?

Colonel DENNIS. Yes, sir.

I was examined there.

Senator CRANSTON. Well, that is beyond comprehension, and inexcusable because the law which I helped write specifically provides that you are entitled to that care.

Colonel DENNIS. I knew that, sir, and I cited the law but I was still denied medical treatments.

Senator CRANSTON. Well, now that you have brought it to our attention, I think we will be able to see to it as Chairman Murkowski has suggested that you will get that care to which you are entitled.

I would just like to say that the country owes you a great deal for your service to our country, and I have great admiration for you, and for your courage in coming before us to state what you are doing, not just for yourself and whatever help we may be able to get you that you were entitled to, but for what it will help do for others, and I thank you very, very much.

Colonel DENNIS. Thank you, sir.

Chairman MURKOWSKI. I thank you very much, Colonel Dennis. The country is very grateful to people such as you who have given so much of their life and their talents.

Senator ROCKEFELLER. Mr. Chairman.

Chairman MURKOWSKI. Senator Rockefeller.

Senator ROCKEFELLER. I want to make a comment before the witness leaves the table, if you would indulge me; and this is something I had not planned on saying. I say this out of conscience and out of the deepest sense of being offended by activities of both sides of the Aisle in this institution, the U.S., and its efforts to publicize its senators. We are all guilty of this.

As the 100th Senator, Colonel Dennis, I am the most junior of all Senators in this Senate; you do not get lower than 100. You are dying and you have told us that; and all during this process, while you were talking about your service and your heroism, and what you went through, there was a camera here which could have been from the Democrat Committee—it happened to be from the Republican Senate Reelection Committee—that was focused on the head of the table.

And I have been to equal numbers of hearings where that has also been done by Democrats. Never once did the camera move to you, sir. Not once. You are a dying man who served this country. Through your courage, you are dying. Yet your compelling story, which is an example of what a U.S. Senator and a Congressman who testified before you propose to solve, was the focus of the camera's attention. The camera instead was on the head of the table.

I have seen the same thing done by both political parties. I cast no blame, but my conscience hurts me. Now, a moment ago, ABC walked in here, and for the first time I saw you receive the attention that you deserve; but before that, there was politics as usual in the U.S. Senate, be it done by Republicans or Democrats, each equally guilty.

I find it offensive, and I think under all circumstances, all 100 members of the Senate would find it offensive; and, particularly in this case.

If we were holding a hearing on some kind of new technological innovation or computer chips or something of that sort—if there was a robot at the witness table, then that is one thing; but when there is a man who is dying because of service to his country who is giving witness so as to help others, for its too late for you to be helped, then I think Democrats and Republicans alike in the United States Senate, elected by our people, owe you the full courtesy.

There are some people back here who may never have been to a congressional hearing before, who may know nothing about this, and what are they to conclude? What are they to conclude as they see this instrument of television never once bother to turn toward you?

Is that their impression of the U.S. Senate? Yes, it will be, and justifiably so.

If you play baseball, you want to get a better contract for the next year.

If you are in the military, you want to seek promotion, and you do the hard work and you do the work in the trenches to try to accomplish that; and if you are in public life, you need to seek reelection if you believe in yourself and if you are good, as the people on this committee are.

But there is a time when this kind of thing grows out of proportion, and I suggest to you, sir, as a hero of this Nation, not that you were offended by it—probably because a television camera can come and go and it makes no difference to you, because you are a dying man—you have told us that.

But I do not know who is back there. I do not know what their impressions are, and I do not know what the symbolism means to them, but symbols count for something. Symbols say things, and count for something. We ought to respect the special dignity and valor of certain people who come before our Senate with honest testimony, after a life of valor.

I thank the Chairman. [Applause.]

Chairman **Murkowski**. Senator Cranston.

Senator **Cranston**. Colonel, I would like to ask you, if I may, Mr. Chairman, one more question.

Did you say that the VA has granted you 100 percent disability?

Colonel **Dennis**. After 29 years, sir, of fighting for those benefits, but the 100 percent is for combat disability, not cancers.

Senator **Cranston**. When was that done?

Colonel **Dennis**. August 23, 1985, sir.

Senator **Cranston**. August 23.

Have you applied for assistance since then, for medical care from the VA?

Colonel **Dennis**. I have been over once. I did not actually apply because I was going for treatment of my head wound, and that usually takes me—it wears me out.

Senator **Cranston**. Under the circumstances, you have been granted 100 percent disability, you are entitled to total comprehensive care. You are entitled to contract care. That means, if the VA cannot give you a blood plasma exchange in their own facilities, they are obliged to furnish that to you by buying it elsewhere for you.

So, you now are in a point where you are totally covered by the VA, and if there is any difficulty in getting that care, please advise this committee at once.

And I would like to ask Dr. Hobson to report, as Chairman Murkowski in general has requested him to report to us, at once why this man has not gotten the care to which he has been entitled?

Thank you.

Colonel **Dennis**. Senator Cranston, may I say one thing?

I could buy a plasma exchange through my military CHAMPUS that covers 75 percent of costs; but a plasma exchange is very dangerous, and I have almost died on the machine several times because I have—I react to fresh, frozen plasma. I carry a Medic Alert card in my pocket. I have to have special treatment in that I have to have—they cannot put fresh, frozen plasma back in me when they take the four liters off; they have to put albumen and saline in. It becomes to where, when you have been on it so many times, like I have, where you become afraid that you are going to not make it, if you do not know who is going to do this. The procedure is highly dangerous and risky requiring meticulious care constantly.

I only point that out because you have to learn to trust that lady or that gentleman that is behind that machine and the blood is running out of you, and the plasma coming off, and they get a residue out of my blood that looks like yellow soap powder, and I have turned as red as that light, with big blotches from the reactions; and there has to be a cancer specialist doctor there, constantly, and a clinical nurse.

I thank you very much sir, for your consideration, and the information you have given me.

Chairman **Murkowski**. Thank you very much, Colonel Dennis.

Colonel **Dennis**. Thank you, sir.

Chairman **Murkowski**. We very much appreciate your testimony.

Senator Rockefeller has made reference to committee coverage, and in deference to his observations, I think it appropriate to state that I, too, when I came in 1980 was the 100th Senator, and you can see what can happen in a relatively short period of time.

As far as your observations as to who was here and who was not, I think you will find that my conduct in the hearing process is to make sure the record is complete in its entirety.

As a consequence, Senator, I do not pay any attention to who is here and who is not, from the press, because that is not my function.

I have asked, however, Chief of Staff, Tony Principi, to indicate for the record who was here, who was asked, and, as far as we can tell, who came and went.

Would you please provide that information?

Mr. **Principi**. To the best of my knowledge, the Senate Republican Senatorial Committee was filming part of the hearing this morning.

ABC, who was interviewing Senator Simon in the hall for television, did not come in.

The Associated Press, a Japanese television crew, and I believe other news media people were in the audience from various newspapers who have expressed an interest in this issue.

Senator **Rockefeller**. I would say to the Counsel, I do not know what I am to conclude from that, and I would——

Chairman **Murkowski**. First, it was not an effort to state anything other than the facts of who was here.

Senator **Rockefeller**. I understand that. And I would say to the Chair that I think that where there is a Republican or Democratic Senatorial Reelection camera involved, maybe it comes down to a matter of sensitivity of the people operating the camera.

It has to do with the fact that a hero of this Nation who is dying, is giving testimony. I don't care if the camera is from ABC, NBC, or CBS; it could have been anybody, but it was never on him.

And I did not notice the camera when I came in. I did not care about it, until I began to notice that it was never on him. He gave riveting, compelling, deep testimony, and he has given it before. It has nothing to do with the chairman; it has nothing to do with the Senior Senator from Virginia; it has nothing to do with the Senior Senator from California, or the Juniorest Senator from West Virginia.

It may have to do only with the sensitivity of the individual folks who operate the cameras, that if they were able to somehow turn their cameras to recognize the witness, a sense of wrongness would not have occurred to me quite so strongly as it has.

My observation is no more than that. And it certainly is not aimed at any of my colleagues on this committee. It is certainly not.

I think what I probably should have said is that it is aimed at the folks on both sides who operate the camera.

Senator **Warner**. Mr. Chairman, I am trying to cover three hearings this morning and——

Chairman **Murkowski**. The Senator from Virginia.

Senator **Warner** [continuing]. And in one hearing there are no less than nine cameras working; and in the 7 years that I have been in the Senate, I have never known us to try and ascertain who the cameras are or in any way try to control them.

But this may be a subject that you might wish to address to the Rules Committee, of which I am a member, and we will take it under consideration.

Chairman **Murkowski**. Thank you very much.

We are going to move on to the next witness—Mr. Don Ofte, Acting Assistant Secretary for Defense Programs, who will be accompanied by Mr. Henry A. Gill, Acting Assistant General Counsel for General Litigation with the Department of Energy in Washington.

Gentlemen, we look forward to your testimony, and would ask that you proceed.

STATEMENT OF DON OFTE, ACTING ASSISTANT SECRETARY FOR DEFENSE PROGRAMS, DEPARTMENT OF ENERGY, ACCOMPANIED BY HENRY A. GILL, JR., ACTING ASSISTANT GENERAL COUNSEL FOR GENERAL LITIGATION

Mr. **Ofte**. Mr. Chairman, and members of the committee.

I am pleased to have this opportunity to appear before you today to discuss section 1631 of Public Law 98–525, which permits the substitution of the United States as Defendant in suits filed against contractors alleging injury as a result of the U.S. Atomic Weapons

Testing Program. The Department strongly supports this law for the reasons that I will discuss.

Many of the contractors who participated in and provided invaluable assistance to the United States Government in the Atomic Weapons Testing Program have come into extensive Federal Court litigation involvement. In this litigation, Plaintiffs are alleging that, as a result of testing by the United States of nuclear devices in the Pacific and in the Continental United States, they were exposed to radiation and developed cancer or other health effects. In lieu of proceeding against the United States, these Plaintiffs are seeking large consequential damages from Federal contractors who carried out the Weapons Testing Program on behalf of the United States.

These contractors are private corporations and universities who accepted the responsibilities inherent in a weapons testing program at the behest of the United States to meet the dangers of World War II.

The decision to use civilian contractors in the U.S. Weapons Testing Program was made at the very highest levels of Government. The policy was reflected in the Atomic Energy Act of 1946, which authorized the use of management contracts in the operation of Government-owned plants built on Government-owned land, so as to gain full advantage of the skill and experience of American industry.

The decision to conduct the first atomic test was made by President Roosevelt. President Truman was provided with detailed information on all aspects of the testing program, often in the course, of conferences with the Chairman of the Atomic Energy Commission. All subsequent Chief Executives authorized and continued to acknowledge the necessity for continuing nuclear tests.

Through the following years, these private corporations and universities have continued to provide unique services to this Department and its predecessor agencies by performing extraordinary tasks associated with Atomic Weapons Testing Program.

The United States has continued to use these contractors in order to have the advantage of the experience and skills that were, and continue to be, essential to maintaining our national nuclear deterrence.

The problems addressed in the pending litigation are uniquely governmental in nature. These problems are defense activities, which, by statute, could only have been conducted by the Federal Government. The United States, itself, therefore, is the real party of interest in this litigation and the only appropriate party to defend claims growing out of the Atomic Weapons Testing Program.

The contractors who participated in the Department's atomic weapons research development and testing program are indeed unique. They are not typical contract suppliers of commercially provided goods or services to the Government. Rather, these contractors had, and continue to possess essential skills utilized exclusively by the United States to design and fabricate atomic weapons. Despite the contribution by these private corporations and universities to the nuclear weapons program, only the Federal Government sets the policy, makes the decisions, and controls the activities and circumstances of the nuclear weapons research, development, and testing program.

Section 1631 of the Defense Authorization Act of 1985, Public Law 98-525, recognizes this important distinction between the control exercised by the United States and the participatory role of the Federal contractor in the nuclear weapons program, by allowing the substitution of the United States as the party Defendant in suits against these contractors and their employees and agents. The United States, through the Department of Energy and its predecessor agenices, was exclusively responsible for the direction and control of the Atomic Weapons Testing Program. Therefore, for the purposes of civil litigation, arising from these activities, it makes sense that the only person sued should be the Federal Government because only the United States can defend its programmatic decisions and objectives in this unique area of national defense. Section 1631 embodies this concept.

The Congress recognizes the inherently governmental nature of the United States Atomic Weapons Testing Program as well as the importance of the contractor's role and its success by the enactment of Public Law 98-525. The Judiciary has reached similar conclusions. On August 29, 1985, Judge Schwarzer of the United States District Court for the Northern District of California upheld the constitutionality of section 1631.

The Court stated that the requirement of due process was clearly met since the "Act applies only to activities conducted under the closest control of the Government undertaken on authority from the President, capable of being solely performed by the Government, and inextricably interwoven with National security." Judge Foley of the United States District Court of Nevada has recently ruled similarly in cases involving workers that have been on the test site.

We are aware that concern has been expressed about the potential impact of section 1631 on veterans who were involved in the Atomic Weapons Testing Program. The administration is firmly committed to ensuring that veterans receive medical treatment for any injuries connected with their service to their country. In this situation, there is a system of compensation in place. Veterans who believe they have suffered injuries are entitled to seek benefits through the Veterans' Disability Compensation Program, administered by the Veterans' Administration. This program was designed by Congress, specifically for the purpose of awarding compensation to all veterans who have service-connected injury or illness.

The Veterans' Dioxin and Radiation Exposure Compensation Standards Act, Public Law 98-542, was enacted in October 24, 1984. It was enacted within the framework of the existing VA Compensation Program, and was carefully structured to ensure that the Veterans' Administration Disability Compensation and Survivors' Benefits are provided to veterans who are exposed during their service to ionizing radiation, or to their survivors for any disabilities or deaths resulting from that service. The act requires that decisions regarding entitlements be based on sound scientific and medical evidence and mandates that the Administrator of the Veterans' Administration establish standards and guidelines for adjudicating individual benefits claims. The VA published the regulation in the

Federal Register on August 26, 1985. Further, the act creates an Advisory Council as a scientific council of that committee to assist the Administrator of the VA in evaluating the results of the studies or the health effects of radiation exposure in order to determine whether additional guidelines are warranted.

The representative from the Veterans' Administration here today will provide more elaboration on the implementation of that act. Therefore, those veterans who presently are Plaintiffs in pending litigation will have access to the traditional administrative remedy available for service-connected injuries under a set of guidelines designed to assist veterans in perfecting valid claims. Section 1631 does not remove or modify benefits previously or currently available to veterans.

This concludes my statement, Mr. Chairman. I will be pleased to try to answer any questions you may have at this time.

Senator **Warner** [presiding]. My question is—my recollection is that there was another member of your Department that appeared before my committee at the time this legislation was considered.

Were you there?

Mr. **Ofte**. No, sir. I was in Albuquerque, NM, at the time.

Senator **Warner**. Therefore, you would not be able to confirm my own recollection; not one single person in the record is not reflected; not one single person had any objection whatsoever to this statute; it was a matter of routine.

Mr. **Ofte**. No, sir, but I do understand that that was the case.

Senator **Warner**. Yes.

Mr. **Ofte**. In fact, as I understand the record, if I may, that section 1631 was included in the President's legislative initiative to Congress; it was written by the Department of Justice; it was approved by the Department of Energy; and, indeed, approved by the Office of Management and Budget; so it certainly represented the administration's policy when it came across.

The——

Senator **Warner**. And it had been staffed throughout the adminstration openly?

Mr. **Ofte**. Yes, sir.

And it lay before the Congress, as I understand it, for several months without comment on it.

It was not——

Senator **Warner**. And the year prior thereto, it was adopted by the Senate, and I think it failed; it did not—it was not passed in the House, is my recollection, though.

Mr. **Ofte**. I am not sure of that, Senator. Perhaps Mr. Gill——

Senator **Warner**. Well, anyway, for 2 consecutive years, the Senate adopted the amendment. There is no——

Mr. **Gill**. Indeed, Senator, there was a day of hearings before the Subcommittee on Administrative Law and Governmental Relations of the House Judiciary Committee, at which the administration testified and the matter was extensively discussed before that committee in a public forum.

Senator **Warner**. That is my recollection.

Now, there is someone in the audience desiring to be heard, and perhaps we can accommodate you when the Chairman returns, but

I think in fairness, we will have these witnesses complete their testimony at this time.

Ms. Fond. She is going to respond to what he says.

Senator Warner. I beg your pardon?

Ms. Fond. She had a comment. She wanted to respond to what he had said.

Senator Warner. Well, I do not doubt that, and we will do our very best to try to accommodate this person.

Now you had completed your testimony, and we are now about to receive testimony from Mr. Gill.

Mr. Gill. I have no prepared remarks, Senator. However, I would like to make just a few comments, and they would refer to the previous witness Colonel Dennis.

If there were ever a classic or a more perfect example to support the wisdom of the Congress in passing section 1631, I think it is the very tragic case of Colonel Dennis.

Colonel Dennis is, indeed, a hero. His courage is clear to all of us. And, yet, I think there is probably one chapter that has to be added to the record of this committee in these hearings that really highlights the problems of veterans who feel their injuries, cancers, or leukemias are caused by the radiation to which they might have been exposed in the nuclear testing.

Colonel Dennis did sue a contractor. He sued the General Electric Corporation.

In the United States District Court for the District of Maryland, in Baltimore, he had a full trial on his claims. It was a 7-week trial. Because it was against the contractor, it was a jury trial.

During the course of that trial, and the pretrial discovery, extensive fact-finding was made, and the blood disease which Colonel Dennis was determined indisputably to have is a rare blood disease called Waldenstrom's macroglobulinemia. The Court was very fortunate in having before it in its fact-finding Dr. Waldenstrom. His testimony was taken in the case. Dr. Waldenstrom was the person who initially identified Waldenstrom's macroglobulinemia. His testimony was absolute that there is no relationship whatsoever between radiation and the disease from which Colonel Dennis suffers.

This is the real problem that many, many of the veterans who claim their illnesses are caused by radiation have—and that is the causation problem.

If they are to pursue these cases in courts, they are going to spend thousands and thousands of dollars hiring lawyers to try their cases. I have no idea how much Colonel Dennis spent on the lawyers who prosecuted his case in Baltimore. But if anybody knows what lawyers' fees are for a 7-week trial, and the discovery that precedes it, it must have been astronomical.

This committee almost simultaneously in passing 1631 also passed the Veterans' Dioxin and Radiation Exposure Compensation Standards Act. That is a complement, practically, to 1631. That particular statute, I believe, again reflects the wisdom of the Congress in recognizing the problems that the veterans have in showing causation, and placing the burden where the Congress feels it should be, now, with the Veterans' Administration in making the determinations on these veterans' claims. And it does not cost the veteran large amounts of money in attorneys' fees to try these cases.

I commend—and I believe on behalf of my Department and the administration—we all commend the Congress for having passed these statutes in tandem. I believe it is the best solution we have at this time to take care of these very, very serious problems, dealing with a lot of uncertainties, that the veterans have.

I thank you for your time.

Senator WARNER. Now, as I understand it, the lady who indicated that she wishes to speak now desires to reserve her comments until you are called as a witness; is that correct?

Ms. LEGARRETA. That is correct.

Senator WARNER. Now, Colonel, you indicate that you want to say a few words.

Colonel DENNIS. May I respond to the gentleman, especially about my trial in General Electric, sir?

Senator WARNER. I think it fair that you be given that opportunity.

Colonel DENNIS. In my trial——

Senator WARNER. I would suggest that you come up. Certainly, we want to have this recorded, and there are a number of microphones here.

Colonel DENNIS. Thank you, sir.

In my suit against General Electric, sir, I spent $4,600. I was able to obtain a small law firm, and I had one—actually two lawyers, but one of them actually did the work.

Regarding the gentleman's statement about Dr. Waldenstrom having discovered macroglobulinemia, I would like to correct it—and this is in the medical literature written by Dr. Waldenstrom, a copy of which I have—Dr. Waldenstrom discovered the sedimentation test, which evolved over the years into a viscosity test. Now, it led to the discovery of macroglobulinemia, but I would like to point out that my suit was against General Electric for radiation exposure on the SL–1 reactor, not the atomic tests, but the Justice Department took it over with 11 lawyers, at times, in the courtroom. We had contacted Dr. Waldenstrom first and asked him to testify for me, and he said, he told my law firm—and I have a copy of this—that he could not, he knew nothing about radiation effects on humans, and he could not testify in my behalf.

Then, after he was contacted by the Justice Department, he decided to be brought over here from Sweden and stay 3 weeks, and the day before he gave his testimony, on videotape, against me, he gave a lecture at Walter Reed Army Medical Center Hematology/Oncology clinic that was treating me for cancer; and he was paid for that, about $20,000, I am told.

He also gave the same lecture at Bethesda for about the same fee and I am not positive of this, but I believe it can be identified, that he went to Brooke Army Medical Center, Texas, and gave the same lecture for the same fee. That is how he was paid for his testimony against me and how the Justice Department got Dr. Waldenstrom's testimony, using unlimited taxpayer dollars and deceptive testimony.

But when they say that my trial proved that my cancer was not caused by radiation; the trial proved only that the Justice Department and DOE will do anything and spend any amount of taxpayer moneys to ensure no one wins a radiation injury suit. The Justice Department took over the case; GE did not even have a corporate lawyer sit in the courtroom, which is normal practice. There was never an indemnification agreement produced to show that the Government had the authority to take that case over, even though I requested the court to provide that essential document. We gave our testimony in 6½ days. I had 11 witnesses.

The Justice Department brought in 35 witnesses for their 7 weeks period; the rest of the trial it was 8 weeks, not 7 weeks—8 weeks of trial; and they produced dolly loads of irrelevant documents, and testimony that was not even relevant, and used 32 of the 35 witnesses; they just inundated the jury with immaterial technical data, which most engineers or scientists could not understand, and then after winning my suit by deception, evidence withholding, perjury, and communication with the jury, they took 30 of those same biased Justice Department trained witnesses and won the radium dial workers' suit in Wichita, KS, of which GE was one of the defendants.

In my opinion, I had no trial. It was a disgrace to justice, as far as I am concerned; and thank you very much.

Senator WARNER. Colonel, thank you for giving us the additional testimony.

[Applause.]

Chairman MURKOWSKI. Please proceed.

Mr. GILL. I submit, Senator, that Dr. Waldenstrom's sworn and unrebutted testimony stands; a jury of 12 ladies and gentlemen in 4 hours came back and found no causation.

Senator WARNER. That is all a matter of public record.

In the event the Congress makes no change—and I am not trying in any way to project what is going to be the outcome of these hearings. That is for the chairman.

In the event there is no change in the statutory framework, should there be additional laws put on that would provide for adequate compensation for this task of——

Mr. GILL. My opinion would be this, Senator, I think, having passed the 1984 statute, the regulations have been written; they have been in effect only 7 weeks. I say, let's see how the system works under the VA's administration of these regulations and let's give them a chance. We have not shown that the machine is broken so why fix it until we can determine that?

Senator WARNER. To Mr. Ofte, the question is, at the time that this legislation was brought before the Armed Services Committee—and I was chairing at the time it was brought up—the representation was made that the private sector would likely not become involved in this work, should this condition of exposure to lawsuits continue.

Is that correct?

Mr. OFTE. Yes, sir.

I think we have perceived during the course of the litigation a chilling effect through our contractors, and it is very important in my mind—and, indeed, the nuclear weapons program would be mortally wounded were we to be deprived of the——

Senator WARNER. I would select some other statement than "mortally wounded." Really, I think that is a very bad choice of words.

Mr. OFTE. Yes, sir.

Senator WARNER. I am a veteran of two wars myself. Let's strike that and try it over again.

Mr. OFTE. Yes, sir.

Senator WARNER. In other words, there would, in your judgment, be a serious deterioration in the framework or, let's say, the group of contractors that normally bid on this type of work, and particularly my recollection was among the universities. The universities were in the forefront of those desiring this type of protection; is that correct?

Mr. OFTE. Yes, sir; we have discussed this with the University of California. They have told us of their concerns should they be found legally liable or vulnerable. Clearly in their minds, and in ours, as concerns their Government-sponsored activities, they would find it very difficult to continue their association with this program.

The same applies also to American Telephone & Telegraph which has that operated the Sandia Laboratories and has done so since 1949, at no fee to the Government.

DuPont Corp. operates our Savannah River plant in a similar arrangement of no fee. For our contractors that are paid management fees, the fee level is one that of itself is not that compelling, so I think that were this provision to be changed, many of the premier industries and universities in the United States today that do participate in this program would not want to continue.

Senator WARNER. Thank you very much.

Mr. Chairman, I appreciate your allowing me to participate in this hearing.

Chairman MURKOWSKI. Thank you. It is a pleasure, Senator Warner.

You have indicated your concern, and obviously, if there is any change in your legislation, the Judiciary——

Senator WARNER. If we have made a mistake in the judgment of the Senate as a whole, I have absolutely no reluctance whatsoever to participate in correcting that mistake.

Chairman MURKOWSKI. And that would be done in the Judiciary Committee as opposed to the Veterans' Committee. I just want to make sure we clarify where it would occur, because I would not want the witnesses, and those participating to assume that it was under the jurisdiction of this committee, if indeed it were not—and that is the case.

I thank you very much, gentlemen—Mr. Ofte, Mr. Gill, Senator Warner; and we will proceed to hear from the Veterans' Administration, Mr. John Vogel, Chief Benefits Director, who will be accompanied by Jack Thompson, Assistant General Counsel, and Lawrence B. Hobson, who is Deputy Director, Agent Orange Projects Office, the Veterans' Administration.

Gentlemen, we appreciate your attendance. We look forward to your testimony, and I see Mr. John Vogel got back from Alaska, and I do not see any signs of frostbite, so I assume that you had a pleasant trip. In fact, you look like you have got a suntan.

Mr. VOGEL. I did, in fact, get a suntan, Mr. Chairman. I think I got that at the Veterans' Day Program on Monday. But I came back from Alaska and got a cold, which I do not attribute to the trip to Alaska; I attribute it to dirty air in Washington, D.C.

Chairman MURKOWSKI. That's probably it, John.

STATEMENT OF R. JOHN VOGEL, CHIEF BENEFITS DIRECTOR, VETERANS' ADMINISTRATION, ACCOMPANIED BY DR. LAWRENCE B. HOBSON, DEPUTY DIRECTOR, AGENT ORANGE PROJECTS OFFICE, DEPARTMENT OF MEDICINE AND SURGERY; JACK THOMPSON, ASSISTANT GENERAL COUNSEL; AND ROBERT WHITE, COMPENSATION AND PENSION SERVICE, DEPARTMENT OF VETERANS' BENEFITS

Mr. VOGEL. Mr. Chairman and members of the committee.

I am pleased to appear today to discuss the VA's regulations issued pursuant to the Veterans' Dioxin and Radiation Exposure Compensation Standards Act.

I will also address the advantages of the veterans' benefits programs as an alternative to tort damage actions in the Federal district courts.

As requested, I will briefly summarize my prepared statement.

With me today are the Assistant General Counsel, Jack Thompson; Dr. Larry Hobson, from the Department of Medicine and Surgery; and Robert White, from the Compensation and Pension Service of the Department of Veterans' Benefits.

On August 26 of this year, the VA published in the Federal Register new regulations governing the adjudication of veterans' benefits claims based on exposure to ionizing radiation in service.

These regulations are the product of an extensive rulemaking proceeding in which the VA addressed comments from a wide range of interested parties from the public, from the scientific community, veterans' groups, and the Executive and Legislative Branches of Government.

The VA's approach in resolution of radiation-exposure claims received the endorsement of the Veterans' Advisory Committee on Environmental Hazards.

As mandated by Congress, the new regulations provide a scientifically and medically sound approach to the adjudication of radiation-exposure claims.

They establish a mechanism for obtaining and assessing radiation dose information which preserves the VA's policy of assuming exposure at the high end of a range of possible dose levels.

Where a claimant submits a dose estimate from a credible expert which differs materially from an estimate derived from official records, the regulations provide for reference to an independent expert to assist in resolving the controversy.

The regulations require initial evaluation of all radiation claims to insure they meet certain threshold requirements relating to exposure, latency periods, and existence of a disease identified in the regulations as radiogenic.

Claims meeting these requirements are evaluated with reference to a number of factors bearing on the relationship between radiation exposure and development of radiogenic disease. In close cases, the advice of an outside expert may be sought concerning application of these factors. The regulations also specifically provide for application of the reasonable-doubt rule in adjudication of radiation-exposure claims.

The VA has expressed its intention to amend the regulations to classify additional diseases as radiogenic as supporting scientific and medical evidence becomes available.

The new radiation regulations became effective September 25, 1985. While it is too early to assess the impact of the regulations, we are confident their implementation will contribute substantially to fair and accurate resolution of radiation-exposure claims.

We believe adjudication of claims under these regulations provides a claimant with several advantages not available in tort actions in the Federal district courts.

The VA adjudication system is nonadversarial, and, as such, offers the prospect of quicker results at far lower costs than could be obtained through the court system.

Unlike the judicial system, the VA system is essentially no fault. The claimant need not prove negligence or other culpability in order to prevail.

Also, application of the reasonable-doubt rule in VA adjudication obviates burden-of-proof difficulties in cases where a balance of evidence exists.

Veterans' benefits offer greater security to the disabled veteran and the veteran's dependents and survivors than does the typical lump-sum tort damage award. Beyond its immunity from attorney and creditor claims, the periodic, perpetual nature of VA compensation assures that the financial needs of the veteran and the veteran's dependents and survivors will be met regardless of future consideration or circumstances.

The VA's comprehensive program of benefits offers relief targeted to the claimant's specific needs. Veterans' disability compensation provides monthly payments indemnifying the veteran for impairment of earning capacity associated with disability.

Upon the veteran's death, survivors and dependents may receive monthly dependency and indemnity compensation; assistance with funeral and burial expenses also available.

Complementing these monetary benefits is the VA's extensive health care program which provides to any veteran alleging exposure to ionizing radiation during participation in the testing of a nuclear device or the occupation of Hiroshima or Nagasaki, hospital, outpatient, or nursing home care, for any condition possibly associated with radiation exposure.

Completing the picture, a variety of other benefits tailored to the actual needs of disabled veterans, such as specially adapted housing grants, automobile and clothing allowances, counseling, vocational rehabilitation, and educational assistance are available to veterans and their families in appropriate circumstances.

Thus, veterans' benefits provide a comprehensive system designed to meet the actual needs of disabled veterans over the long term and as such provide an attractive alternative to tort litigation.

This concludes my prepared remarks, Mr. Chairman.

I will be pleased to respond to any questions.

Chairman **MURKOWSKI**. Thank you, Mr. Vogel.

[The prepared statement of Mr. Vogel follows:]

STATEMENT OF R.J. VOGEL
THE CHIEF BENEFITS DIRECTOR
OF THE VETERANS ADMINISTRATION
BEFORE THE
SENATE COMMITTEE ON VETERANS' AFFAIRS
November 14, 1985

Mr. Chairman and Members of the Committee:

I am R.J. Vogel, Chief Benefits Director of the Veterans Administration (VA). I am pleased to appear today to discuss the VA's regulations issued pursuant to the Veterans' Dioxin and Radiation Exposure Compensation Standards Act. I will also address the advantages of the veterans' benefit programs as an alternative to tort damage actions in the Federal district courts.

On August 26 of this year, the VA published in the Federal Register new regulations governing adjudication of veterans' benefit claims based on exposure to ionizing radiation in service. These regulations are the product of an extensive rulemaking proceeding in which the VA received comments from a wide range of interested members of the public, the scientific community, veterans' groups, and the executive and legislative branches of government. The comments from these sources were addressed when the VA published its final regulations in the Federal Register and a number of suggested changes were adopted. The VA's approach to resolution of radiation-exposure claims has received the endorsement of the Veterans' Advisory Committee on Environmental Hazards, a distinguished body of lay and scientific members assembled to assist the VA in resolving issues relating to veterans' exposure to radiation and dioxin. As mandated by Congress, the new regulations provide a scientifically and medically sound approach to the adjudication of radiation-exposure claims.

The new regulations specify standards, criteria, guidelines and procedures for resolution of radiation-exposure claims. They establish a mechanism for obtaining and assessing radiation dose information which preserves the VA's policy of assuming exposure at the high end of a range of possible dose levels. Where a claimant submits a dose estimate from a credible expert which differs materially from an estimate derived from official records, the regulations provide for reference to an independent expert to assist in resolving the controversy.

The regulations also require initial evaluation of all radiation claims to assure they meet certain threshold requirements relating to exposure, latency periods and existence of a disease identified in the regulations as radiogenic. Claims meeting these requirements are evaluated with reference to a number of factors bearing on the relationship between radiation exposure and development of a radiogenic disease. In close cases, the advice of an outside expert may be sought concerning application of these factors. The regulations also specifically provide for application of the "reasonable-doubt rule" in adjudication of radiation-exposure claims.

The VA has expressed its intention to amend the regulations to classify additional diseases as radiogenic when sound scientific and medical evidence supporting such action becomes available. The Advisory Committee on Environmental Hazards will assist in identifying such diseases.

The new radiation regulations became effective September 25, 1985. They have been distributed to VA regional office personnel and are currently being used in claims adjudication. VA representatives have met with groups specializing in representation of radiation-exposed veterans to explain the new procedures. While it is too early to assess the impact of the new regulations, we are confident their implementation will contribute substantially to fair and accurate resolution of radiation-exposure claims.

We believe adjudication of claims under these regulations provides claimants with several advantages not available in tort actions in the Federal district courts. The VA adjudication system is non-adversary and as such offers the prospect of quicker results at far lower cost than could be obtained through the court system. While tort actions may drag on for years, a VA claimant may obtain an administrative decision in a matter of months. Should an appeal be required, Board of Veterans Appeals' response times for completing appellate action compare very favorably with the time required to resolve judicial appeals. Further, the VA claimant need not share his or her award with an attorney. In contrast, one-third or more of a tort award may benefit an attorney rather than the injured party.

Unlike the judicial system, the VA system is essentially no fault; the claimant need not prove negligence or other culpability in order to prevail. Also, application of the reasonable-doubt rule in VA adjudications obviates burden-of-proof difficulties in cases where a balance of evidence exists. Moreover, decisionmaking under the new VA regulations involves application of established, uniform procedures based on sound scientific and medical evidence. Resort to these procedures permits claimants to avoid the uncertainties of recovery inherent in tort litigation.

Veterans' benefits offer greater security to the disabled veteran and the veteran's dependents and survivors than does the typical lump-sum tort damage award. Beyond its immunity from attorney and creditor claims, the periodic, perpetual nature of VA compensation assures that the financial needs of the veteran and the veteran's dependents and survivors will be met regardless of future circumstances. In contrast, a lump-sum tort award may be, and all too often is, wiped out by unexpected developments or unsuccessful financial management. The adequacy of lump-sum tort awards is subject to frequently speculative estimates of earning potential, longevity, inflation and future level of disability. In comparison, veterans' compensation programs offer a stable, long-term source of income which may increase as degree of disability changes. Further, Congress has consistently adjusted compensation benefits to account for the effects of inflation.

The VA's comprehensive program of benefits offers relief targeted to the claimant's specific needs. Veterans' disability compensation provides monthly payments indemnifying the veteran for impairment of earning capacity associated with disability. Additional compensation is available to cover the extra expenses of housebound veterans and those in need of aid and attendance as a result of disability. The most severely disabled veterans may receive tax-free monthly payments of up to $3697 from the VA. Further compensation may be paid for dependents where a veteran's disability is rated at 30 percent or more.

Upon the death of a veteran from a service-connected disability or after a prescribed period of service-connected total disability, the veteran's survivors and dependents may receive monthly dependency and indemnity compensation. Assistance with funeral and burial expenses is also available.

Complementing these monetary benefits is the VA's extensive health care program. Under the terms of Public Law No. 97-72, any veteran alleging exposure to ionizing radiation through participation in the testing of a nuclear device or through service in Hiroshima and Nagasaki during the occupation who needs hospital, outpatient or nursing home care for any condition possibly related to radiation exposure is eligible for medical care without having to certify inability to defray the cost of care. These veterans have a priority for outpatient care second only to service-connected veterans. In addition, the CHAMPVA program provides payment for hospital and medical services and supplies obtained from private health care sources by dependents and survivors of certain service-connected veterans.

Completing the picture, a variety of other benefits targeted to specific needs are available to disabled veterans and their families in appropriate circumstances. Among these benefits are specially adapted housing grants, automobile and clothing allowances, counseling, vocational rehabilitation and educational assistance, and special insurance programs. These diverse programs offer help that is tailored to the actual needs of individual disabled veterans.

While we can only speculate as to veterans' prospects for recovery in tort damage actions against government contractors, we do have knowledge of the experience before the VA of veterans with radiation-related claims. Over the past several years, the VA has established service connection in twenty-three claims involving allegations of radiation exposure during participation in atomic weapons testing, where disability arose after discharge from service and expiration of any applicable post-service presumptive period. Service connection has been granted in approximately sixty other claims in which disabilities arising in service or within a presumptive period were attributed by the claimant to radiation exposure caused by atomic weapons. Over 5,500 inpatient admissions and 10,000 outpatient visits to VA medical facilities for conditions which cannot be disassociated from radiation exposure have occurred under Public Law No. 97-72 since October 1982.

Although the figure for compensation awards is not great in comparison to the number of claims received, certain factors regarding the nature of radiation-exposure claims must be considered. For example, in some 38% of all claims involving alleged radiation exposure in atomic weapons testing, there is no diagnosed illness. In many others, the diseases underlying the claims are not diseases associated with radiation. Often, the radiation dose received by the veteran is extremely low, in the range where scientific evidence does not reveal a significant risk of harm from radiation exposure.

Finally, we note that, given the scope of the VA's benefit programs, the availability of damage awards to veterans and survivors eligible for veterans' benefits would raise the prospect of duplicate compensation for the same harm through the judicial and administrative processes.

The VA's programs are better designed to serve the needs of veterans and their families than are remedies available through the court system. Veterans' benefits provide a comprehensive system designed to meet the actual needs of disabled veterans over the long term and as such provide an attractive alternative to tort litigation.

This concludes my prepared remarks.

Chairman MURKOWSKI. Mr. Thompson, or are there other statements to be made?

Mr. THOMPSON. None.

Dr. HOBSON. None, sir.

Chairman MURKOWSKI. Thank you. I am curious, because of the uncertainty that does exist in the scientific evidence concerning exposure, what is the VA's responsibility as you see it toward those veterans, like Mr. Dennis, who are obviously seriously ill and who did participate in the atomic test programs as evidenced by their service records, and who believe their illness to be related to that experience?

Mr. VOGEL. I do not know the particulars of the colonel's case at all, sir. The adjudicative determination likely was one which hinged on the level of exposures as recorded, and there has been adequate testimony in here from time to time of the inadequacy of the recordation of exposure.

Even if the exposure is conceded to be significant, that would turn on whether or not the disease now presented is in fact radiogenic in nature.

Chairman MURKOWSKI. Well, we seem to have a situation here which you might term extraordinary and also classic in the sense that we all observe the bureaucracy and the system and the rules and regulations that have to exist for the system to function, but when you get to the particular case, there seems to be a certain shuffling. For example, Mr. Dennis was treated evidently at Walter Reed and something happened to terminate that.

He is eligible for Veterans' Administration health care but not entitled to veterans' disability compensation. In the meantime, he is living from day to day, and the system is not responsive, in the personal sense, to him as one individual who has had an extraordinary experience, and he has cited that. The VA and the Department of Defense applies rules and regulations without considering the uniqueness of a situation such as occurred here now.

We have indicated from the committee that we will inquire and initiate inquiries today to both Walter Reed and the VA on the specifics.

My question is, and it is a specific one, can you enlighten us on why he would have been refused treatment in the VA even though a response has been made by Dr. Hobson and others that he is eligible for VA care? What do we do to help an individual who is obviously confronted with perhaps a person at a lab who says, well, I cannot do this for you?

Maybe it is because Walter Reed has changed personnel in the area. How do we handle this? Is there a place for a person like Mr. Dennis to go that would be a kind of buffer and help him out and get him through the difficulties?

Mr. VOGEL. I think that is the challenge of every administrative manager in Government to address what you speak of generally, Mr. Chairman. Whether or not the formal application for medical care was made and when it was made, I noted from listening to his testimony that the commencement of treatment for his ailment including chemotherapy was before the date of the enactment of the legislation which provided care without question to veterans alleging disability caused by exposure to ionizing radiation, without having to establish that there was in fact a causal relationship.

More than that I think perhaps that the lack of formal application but the reliance that he very likely may have placed upon some other person who counseled him or sought to give him advice or gratuitously gave him advice about whether he was eligible, apparently I think since 1981 and thereafter whether he needed to find the continuation of that same sort of care that he could not get at Walter Reed, we certainly should have picked that up.

I winced when I heard the story. I promise you that we will find an answer to it. How we prevent our people who determine eligibility for medical care and compensation, keep them from being foolish or stupid, is a challenge to all of us.

I listened with interest and as I indicated, Mr. Chairman, I winced in hearing the story. I, myself, receive VA medical care and the quality care is there. Sometimes it is a little hard to get in the door.

Chairman MURKOWSKI. Dr. Hobson, would you care to enlighten us further?

Dr. HOBSON. Mr. Chairman, I did have an opportunity to inquire as Senator Cranston requested whether in fact the VA hospital here in Washington can perform a plasma exchange. The answer is, we cannot perform it at that hospital.

Instead of that, however, there is an arrangement made whereby we refer the veteran to the National Institutes of Health where the procedure is carried out, and this would be without any cost to the veteran at all.

This would be particularly true in a 100-percent compensated veteran. As to what you do when there is an unfair turnaway from the hospital, it is a little difficult to say. I will say that the VA health care has more ombudsmen than any other health care I have ever heard of.

Every hospital welcomes, not tolerates, but welcomes representatives of the various veterans organizations. They act in the veteran's behalf. If there is a miscarriage in the admissions policy or something, that would ordinarily be where we would expect to hear from them and take action.

They are very vigorous in pursuing such matters I understand.

Chairman MURKOWSKI. Thank you. I am wondering is there an effort under the case management concept where a veteran who has an extraordinary situation involving his care that he is assigned to an individual caseworker, and perhaps the wording is inappropriate to call it caseworker, but an individual who has his or her history that can follow up and expedite the process?

I recognize it cannot be done for everybody, but there are extraordinary cases. I think we have certainly heard one today. Is that a functional procedure within the VA or is it impractical because of the nature?

Mr. VOGEL. Mr. Chairman, I am presuming to speak for the medical side of the house, and I will try to do it to the extent that I feel comfortable in doing so. The VA does have social workers, and they do in fact attempt to provide the care beyond the kind of community care a veteran patient might need.

I think usually that service is for during hospitalization and post hospitalization. I think outpatients probably have a little harder time not having those connections made to people that would monitor their case in a caseworker type fashion.

Chairman **Murkowski**. Dr. Hobson, can you shed any light on that?

Dr. **Hobson**. Well, apparently the person responsible for a patient's care under any circumstances is the physician who is looking after the—I guess you would call it the principal illness or disability. That person bears the responsibility for seeing that the care is continuous, and is adequate in all respects.

I do not know whether you can characterize that as a caseworker. Nevertheless it is the responsible physician under those circumstances. That is true in the VA as it is in any other medical setup.

Chairman **Murkowski**. Do you have any idea of the percentage of claims related to exposure from atmospheric nuclear weapons tests of atomic veterans that have been denied to date. I assume we are talking now about denied benefits as opposed to being denied medical care. We are.

Mr. **Vogel**. Yes, sir. We do not have enough experience under the current procedures to make a judgment about how that procedure is working. We have a registry that we maintain, somewhere in the neighborhood of 5,000 cases filed for compensation benefits, and in about 40 percent or 41 percent of those cases there is no diagnosis whatsoever.

Of the remainder a very small percentage as Senator Rockefeller mentioned, not the number but the percentage—he mentioned both of them I guess, about 15, or a 1/2 of one percent, have been awarded compensation for a disability adjudicated to have been caused by exposure to ionizing radiation.

Chairman **Murkowski**. Well, it seems like in the case of Mr. Dennis he is blocked. I assume I am correct in my recollection that he was a member of the service at the time that he was exposed to the fallout which the contractor was basically doing a job for the Government, and when he proceeded to file against the contractor and the court ruled otherwise, he had no claim against the Government. So he had exhausted basically his legal remedy which is an extraordinary set of circumstances in view of what he was subjected to during his military association.

It would certainly seem appropriate and fair that there be some way to expedite his compensation claim without constantly coming against a wall of either the court indicating that the contractor was not responsible and not addressing the question of compensation for the gentleman, Mr. Dennis, which appears to be the case here, and then the Government not being allowed access from the Government. Of course that is the whole purpose of this hearing. Let me ask you this, gentlemen. You professionally have been in the VA for a period of time. Why is it that this particular issue which was so prominent after the experiments in the 1950's and we gained more and more knowledge about radioactive fallout and the association of coming in contact with it, why has there not been some effort to bring this to a head in a resolve prior to this time because it is pointed out in some of the testimony that if we wait much longer, why there is not going to be anybody left to compensate?

That certainly is not the American way, and it is not fair. I recognize the difficulties you gentlemen represent in the legal fraternity in one capacity or another from time to time. How can we equitably address cases such as Mr. Dennis when time goes on and we debate the merits of whether the Government does have a responsibility or the contractor has a responsibility, and in the meantime the victims grow older?

Mr. VOGEL. Mr. Chairman, my opinion would be that it is more or less a case of the squeaky wheel that gets the oil. I think it is belated enlightment of the American people, and clearly I think the vigorous advocacy of the groups represented here today will help.

I think they have raised the issue and demanded an answer. I think their Government at least as far as the Veterans' Administration is concerned—when it looked—when the issues became very prominent, publicly prominent, I think the thought was, well, this may be a temporary thing.

It is a very thorny issue. It is fraught with difficulty. The scientific evidence is incomplete, and clearly it did not go way. It surfaced and kept surfacing and surfacing until the Congress passed some laws and we implemented regulations to try to bring some scientific and some logical sense to that which was shrouded in mystery.

I would like to correct something I said before about the number of veterans who have been granted compensation for radiation-exposure caused diseases. The total from atomic testing is 83, the bulk coming from the Board of Veterans Appeals, and for non-atomic testing, but other radiation exposures, that number is 104. That total is 187, still a very small number, with about 5,000 claims made to date.

Chairman MURKOWSKI. One more question. Is it not possible under the new VA regulations for veterans previously denied compensation to receive a service-connected rating for a radiogenic type disability?

Mr. VOGEL. Yes; sir, it is.

Chairman MURKOWSKI. How is that done?

Mr. VOGEL. We would merely reopen the claim. We can identify the claims. We do keep a registry of them. We would reopen the claim and then we would obtain whatever additional evidence might be made available to us from the Defense Nuclear Agency and others.

Claims can be reopened at any time.

Chairman MURKOWSKI. Well, how does Mr. Dennis get his claim reopened?

Mr. VOGEL. Pardon me, sir.

Chairman MURKOWSKI. How would he initiate reopening his claim?

Mr. VOGEL. Merely by communicating his desire to do so. I do not know on what basis he is doing it?

Chairman MURKOWSKI. I would trust that that would occur. Will the VA attempt to contact all atomic veterans who had claims denied and inform them of the new regulations?

Mr. WHITE. We will shortly next month, Mr. Chairman, be contacting veterans who were previously denied for a radiogenic disease as listed in the regulations.

Voice [Female]. Widows too?

Mr. WHITE. I do not think——

Chairman MURKOWSKI. I am sorry. If you care to direct a question you may do it through staff, and I would be happy to try and accommodate you, but I would rather not accommodate people off the floor.

Would you go over there and ask the lady what her point is?

Mr. WHITE. If we can identify the current address, we will advise claimants of the opportunity to reapply.

Chairman MURKOWSKI. All right, gentlemen, I think we have substantively communicated to the people the fact that there is a possibility under the new VA regulations that claims previously denied may be reopened on the basis of radiogenic disability, and the fact that the VA will be contacting all atomic veterans who had claims denied to inform them of the new regulations. I think it is a very positive and meaningful step, and would be welcomed by many who are here today.

I do not know how many claims are going to be reopened, but that is your area of responsibility. I have no further questions. Senator Matsunaga has joined us and I want to welcome him to the Committee.

We are still proceeding. We have had some very moving testimony, and it has been a very worthwhile hearing. I think we have a good record. If you would care to make any comments?

Senator MATSUNAGA. Thank you, Mr. Chairman. I apologize for my tardiness but I believe it is understandable that a Senator has so many places to be all at the same time. I made an effort to attend this hearing because I have been very much disturbed over the fact that, according to reports which I received 99½ percent of the claims of atmospheric nuclear weapons tests atomic veterans have been denied their claims to date. Is that the correct percentage?

Mr. VOGEL. Yes, sir; it is.

Senator MATSUNAGA. Now, as Chief Benefits Director, Mr. Vogel, are you disturbed by this figure?

Mr. VOGEL. Yes, sir; I am.

Senator MATSUNAGA. And you feel that under the new regulations that perhaps we can improve on that figure?

Mr. VOGEL. I think with the new regulations, and more than that coupled with better, scientific evidence and medical evidence, we should improve in that regard.

Senator MATSUNAGA. What has been the principal basis of denial to date?

Mr. VOGEL. The principal basis would be, probably the first would be—well, in about 40 percent of the cases, Senator, there is no diagnosis of illness at all.

People were making claims and asking us to sort of verify whether they were in good or bad health. So notwithstanding the number of claims that have been made, the first thing I think we would look at is the level of exposure, and that was reported to us by the Defense Nuclear Agency, from badge readings, unit badge readings, individual badge readings and knowledge about the unit movements in the atmospheric test sites.

If that level of exposure is at a certain level and the disease is considered to be radiogenicly caused, then you have service-connection in such a case. Those things have to come together. He could be acutely ill, chronically ill with a relatively high level of exposure, and the determination being that illness is radiogenic in nature.

Senator **Matsunaga**. Have there not been differences on the estimation of the amount of exposure the veteran has had?

Mr. **Vogel**. Yes; there have been. We are generally reported a range. When that range is reported to us, Senator, we take the higher figure of the range.

Senator **Matsunaga**. That was my next question, that you do take the higher estimate?

Mr. **Vogel**. Yes, sir; we do.

Senator **Matsunaga**. Then you feel that under the new regulations there will be better breaks for the veterans. About what increase in percentage do you foresee?

Mr. **Vogel**. I would be afraid to hazard a guess. We have not been long enough into the new regulations as to have any——

Senator **Matsunaga**. Well, let's put it this way then. Do you feel that the claims which have been denied to date upon review may be granted under the new regulations?

Mr. **Vogel**. I think there is opportunity for a few. I would not pretend to say that the number would be large. I think it will be relatively few in number.

Senator **Matsunaga**. Few in number?

Mr. **Vogel**. Yes; I would think, you know as a percentage of the whole. I would be pleased to provide the information as we have experience in this to the committee on a regular basis.

Senator **Matsunaga**. Well, that bothers me again. Then what use is the new regulations if the review is going to be just another routine to go through for denial?

Mr. **Vogel**. I would not classify it as merely routine. We are sensitive to the acute needs of those individuals and mean to do right by them. In indicating the probability of a larger number, I am thinking of the number of claims in which the illness now presented is not regarded in the medical community as having any causal relationship with radiation exposure. The number of cases in which we had already had a diagnosis, those are the leukemias and those other disorders, I think the outcome will be more favorable for our veterans.

Senator **Matsunaga**. You may have already expressed the view if a question was asked, but how do you feel about the denial of judicial review on the part of the veterans?

Mr. **Vogel**. I am sorry, sir. The Warner amendment, sir?

Senator **Matsunaga**. Well, the way we have it today, as I understand it, under the current law an atomic veteran cannot sue either the Government or private contractors for injuries relating to atomic radiation.

Under the Feres Doctrine the military is exempted from liability for injuries to servicemen that occur in the course of their service.

Under the recently passed Warner amendment, Defense contractors pass on their liability to the Government, and because the Government has no liability vis a vis service related injuries, atomic veterans again have no recourse to the courts.

Now the interlocking nature of the Feres Doctrine, the provisions of the Warner amendment, and the lack of judiciary review in the VA claims process, has effectively barred atomic veterans from having any relief whatsoever, has it not?

Mr. VOGEL. Yes, sir.

[Applause.]

Senator MATSUNAGA. No demonstration, please. It is against the rules. As a politician I should appreciate it, and I thank you for it, but what we are trying to do here is to determine what the facts are, what solutions there are to a very grave problem we have. So no demonstrations, please. Your response, Mr. Vogel?

Mr. VOGEL. I think the scenario that you so carefully laid out is a true one. I think the outcome of this hearing and the ones likely to follow it to afford others the opportunity to be present and be heard, out of that may yield some avenues to an otherwise deadend street for some who have exhausted administrative remedies and the availability of the courts with respect to bringing suits against the contractors for the Government is just not there.

Senator MATSUNAGA. Representing the VA and the administration, if that be so, would you object to changing the laws to permit veterans judicial review?

Mr. VOGEL. It is the view of this administration that judicial review is an unnecessary step given the nonadversarial nature of the claims adjudication process in the Veterans' Administration.

Senator MATSUNAGA. How firm is that commitment?

Mr. VOGEL. It has been examined from time to time I think, that commitment. Today I cannot speak for the—I can speak that that is the view today that we are opposed to judicial review, that is this administration.

Senator MATSUNAGA. Oh, it looks like I am now the acting chairman. Any further questions. Well, if there are no further questions, we will call up the next panel of witnesses. Thank you gentlemen. I appreciate your being here.

The next panel of witnesses are as follows: Alvin M. Guttman, Legislative Counsel, and accompanied by Victor F. Tolley, member, National Association of Atomic Weapons in Washington, DC, Dorothy Legarreta, Ph.D., Administrative Director, accompanied by Felice Fond, member, National Association of Radiation Survivors from Berkeley, California.

Will the witnesses please come forward.

Mr. GUTTMAN. Good afternoon, Senator.

Chairman MURKOWSKI. Good afternoon. Now, we will begin with you, Mr. Guttman.

Mr. GUTTMAN. Thank you.

STATEMENT OF ALVIN M. GUTTMAN, ESQ., LEGISLATIVE COUNSEL, NATIONAL ASSOCIATION OF ATOMIC VETERANS, ACCOMPANIED BY VICTOR F. TOLLEY, MEMBER, NATIONAL ASSOCIATION OF ATOMIC VETERANS

Mr. GUTTMAN. The National Association of Atomic Veterans is very grateful for the hearing today. We represent the interests of 250,000 veterans that were involved in the atomic tests between the years 1945 and 1962, including Hiroshima and Nagasaki ground troops that were in Japan directly after the atomic bombs were dropped.

It has been pointed out today that radiation exposure does, in fact, cause radiogenic disease—cancers, multiple myeloma, leukemia, genetic diseases.

I do not feel that I need to go into the experiences of our atomic veterans since James Dennis told us so eloquently this morning of the particular circumstances that he was in; and other veterans, of course, were in some instances quartered a mile away from the atomic blast with no protection whatsoever except their helmets and their flac jacs. They marched through the blast site, in many instances moments after the atomic bomb was detonated, ingested radiogenic particles from the fallout.

Senator, we want to thank you for the questions that you posed to the VA. I think it is the first time in this committee that those specific questions were asked, and it is very important. It points out specifically the inadequacies of the VA regulations, and I am grateful for you to point that out.

First of all, the regulations are specifically based on proving service-related disability, an absolutely impossible task to prove.

The denials are based on inadequate dose readings and reconstruction of dosimetry, which is the Government's responsibility.

In many instances, individuals never received dose badges to record the amounts of radiation they received. The film badges, if they did wear them, were very elementary. We are talking about 40 years ago.

In many, many instances, radiogenic particles were ingested by these individuals and the badges would never pick that ingestion up. That has been pointed out time and time again.

Records have been lost. It is 40 years ago when these tests began. There was a fire in St. Louis, and it is absolutely impossible for many of these people to prove they were damaged.

And we have just been told today, by the Veterans 'Administration, that we do not expect the new regs to have a substantial effect on the amount of new claims. Well, that, to me, is a travesty; and I think that points out very clearly the issue that the atomic veteran soldier is up against. It is a disservice for this country to be relying on the data that I have just mentioned to you—the untrustworthy dosimetry readers, to try to prove that causal connection.

You are placing—or I should rather state the VA is placing the burden of scientific and medical evidence upon the soldiers themselves. It is an impossible burden for them, and therefore they are denied.

They deserve better, Senator, than what happened. One-half of one percent of their claims being approved, 15 out of 3,000. These people deserve better.

The Atomic Veterans' Relief Act that Paul Simon and Lane Evans have introduced—S. 707 on the Senate side—is a total approach to the problem; and that is why we are here today.

It grants presumptive relief. If you were at the test site, if you have contracted leukemia, do not ask the individual soldier to prove anything scientifically that his leukemia was caused by that blast site. Let's accept it, and grant them presumptive relief.

We are not talking about billions of dollars; we are talking about the same kind of compensation that an individual would receive if he received a bullet wound or a shrapnel wound in his back.

The problem is that our atomic veterans cannot prove that disability, cannot prove the service-related disability.

We are confined to a finite group of people—this is not Pandora's Box. There are 5,000 claims, total, at the VA right now. We have spent $414 million studying this problem. If that money was used to compensate our people, this problem would have been over years ago. There is no excuse for that. These people have paid their dues.

This legislation that we are referring to takes the impossible burden of proving their case off the shoulders of the veterans. It does not place reliance on inaccurate, rudimentary dose readings.

The regulations simply do not address these important issues and we have heard today that they probably will not work.

To add wood to the fire, as though these atomic veterans do not have enough to worry about, last year, the DOD appropriations bill contained the Warner Amendment, and this created a problem that our atomic veterans no longer have access to the courts for claims against Government contractors. As though they do not have enough problems. Now, they have to go back and fight for their right to go to court. Fundamental rights they have had denied. Prisoners incarcerated, criminals have more rights than these atomic veterans.

Vietnam veterans can pursue their claims against Agent Orange companies—chemical companies; we do not have that right now; it was taken away from us. It has also been pointed out by the individual, Mr. Gordon Erspamer, who is an attorney representing California claimants in the Federal Court in California, that his specific case was dismissed based on this Warner Amendment.

They never had a chance to prove their case. We are not dealing with the merits of the case; we are dealing with the right of access to the courts; and that is shocking.

In addition, moreover, these people have no judicial rights to their administrative requirements. They also have no rights to counsel. There is a $10 fee limit. A bill that was passed in the 1860's to deny these people the right of counsel.

We need to reverse a very surprising error. These people need access to the courts. We have a problem where the Defense contractors are concerned about what would happen if the Warner Amendment were repealed. Well, they do have the right to indemnification. That is clear.

Fortunately, people are starting to listen. Congressman Boucher introduced a bill on the House Judiciary Committee, H.R. 1338, which allows for atomic veterans to sue Federal contractors.

Chairman **Murkowski**. Excuse me, I am going to interrupt very briefly, and simply apologize. I have to go to the floor on some amendments that are coming up that concern me that I—they are waiting for me to introduce, so I do apologize to my colleagues and would ask that the hearing proceed.

I will look forward to reviewing the testimony of those that I have not yet personally heard. I apologize.

Mr. **Guttman**. Thank you, Senator.

Senator **Matsunaga** [presiding]. Inasmuch as there will be votes on the floor, unless the others will not testify, if you would make your points brief.

Mr. **Guttman**. Absolutely.

Senator **Matsunaga**. Will the others be testifying also?

Dr. **Legarreta**. Yes.

Ms. **Fond**. Yes.

Senator **Matsunaga**. All right, then.

Mr. **Guttman**. My next and last point is the Boucher bill is moving out of Judiciary Committee and it passed subcommittee markup.

We deserve our day in court, regardless of the merits of the case.

Today, I am accompanied to take questions—Mr. Victor Tolley, on my right—a marine in the Pacific during World War II, was involved in the cleanup at Nagasaki between September 23 and December 6, 1945.

He also appeared Monday night on "Nightline."

The atomic veterans with other counterparts patriotically served their country's needs. In their case, the battle never ended. In fact, it is only becoming worse.

They seek no special favors—simple justice.

Thank you very much.

Senator **Matsunaga**. Thank you, Mr. Guttman.

[The prepared statement of Mr. Guttman follows:]

Testimony on Atomic Veterans

Alvin M. Guttman , Esq.
Legislative Counsel

National Association of Atomic Veterans

before the

Senate Committee on Veterans' Affairs

Presented
November 14, 1985

Mr. Chairman and Members of the Committee:

Thank you for this opportunity to present the views of the National Association of Atomic Veterans (NAAV) with respect to the Veterans Administration (V.A.) atomic veteran claims adjudication process, and to the so-called Warner Amendment which bars atomic veterans from obtaining judicial recourse.

BACKGROUND

Atomic veterans are the servicemen who served during the atmospheric nuclear weapons testing program conducted between 1945 and 1962, or during the post-bomb occupations of Hiroshima and Nagasaki.

Approximately 250,000 U.S. servicemen took part in the nuclear weapons test detonations in Nevada and in the Pacific. Participants were ordered to perform various maneuvers in the open without protective clothing or respiratory devices. For instance, soldiers marched, on command, to and around ground zero, the site of the blast itself, so that motor coordination and stress levels could be observed by onlooking psychologists. Seamen were often ordered to scrub the decks of radioactive, or "hot" ships within hours of a test blast.

Many atomic veterans have died or are suffering from cancers and other diseases. Many children of atomic veterans were born with genetic deformities. A health survey of NAAV members was conducted by NAAV in 1982. Out of a total of 700 responses, 39% reported they had contracted some form of cancer, 67% reported some form of neuromuscular disease, and 51% of the respondents reported problems with their offspring, including retardation, skeletal and organ defects and various other disorders. Preliminary findings of a NAAV survey released this year show similar or increased percentages for most illnesses and symptoms.

Atmospheric test atomic veterans suffering from these delayed reactions have filed claims with the Veterans' Administration for service-related compensation. More than 99% of these claims have been denied. There is little consistency with regard to the 1/2 of 1% of claims which have been granted, and the vast majority which have been denied.

SCIENTIFIC AND MEDICAL UNCERTAINTY

The instruments used to measure test participants' radiation doses were rudimentary. Film badges, which were supposed to measure individual doses were not issued to all participants. Badges that were issued and properly worn were unreliable. They did not register cell-damaging neutron particles, and they did not measure the ingestion of dangerous alpha particles through dust or water. The performance of other equipment designed to measure radiation, such as dosimeters, was affected by the adverse conditions under which the tests were conducted, including heat and dust. Furthermore, many military records containing radiation dose information were destroyed by a fire in a military facility in St. Louis.

It is therefore difficult to determine with any degree of accuracy the amount of radiation a particular veteran received.

Aside from this is the fact that the medical and scientific communities are uncertain as to what constitutes a dangerous dose.

In hearings before the House Veterans' Affairs Subcommittee on Oversight and Investigations on May 24, 1983, (House Report 98-20), Defense Department Spokesmen General Harry A. Griffith and Dr. David Auton reviewed Federal studies on the health effects of low-level radiation exposure, and repeatedly cited a U.S. government safety standard of 5 rem exposure. General Griffith stated that 5 rem is "what anybody who works in the radiation business, like x-ray technologists... may receive in one year". Dr. Auton testified, "I think that the 5 rem Federal standard has been a good one and I think that if we encourage the notion that exposures to half a rem or a rem is hazardous to the health, that it could reflect seriously in major ways in our civilian economy as well as in our military." Later in the hearing, Dr. Seymour Jablon, testifying for the National Academy of Sciences, observed, "I have heard the argument this morning about 5 rads (note "rad" and "rem" are used interchangeably) being the safe level, and that is wrong. Five rads is an administrative number...And there is nobody in the world that can prove it's safe."

A major government study conducted by the National Academy of Sciences compared the mortality rate of atomic veterans to that of the general population. The results of the study, released in June 1985, showed that atomic veterans suffer no ill effects related to their exposure to ionizing radiation. An eminent independent statistician, Dr. Irwin Bross, felt that the N.A.S. findings were statistically invalid because no adjustment was made to correct for the "healthy soldier effect." Veterans are healthier than the general population because they were screened for good health when they entered the service. A comparison of veterans to the general population created a huge selection bias in the N.A.S. study, which made the findings inaccurate.

Dr. Bross reevaluated the extensive government data provided in the N.A.S. study, correcting for the healthy soldier effect. He found significant excesses of cancer, cardiovascular disease and cirrhosis among atomic veterans. A copy of Dr. Bross's findings are attached to my testimony.

INADEQUACY OF LEGISLATIVE AND ADMINISTRATIVE MEASURES REGARDING THE VA CLAIMS ADJUDICATION PROCESS

In the midst of the inconsistency and confusion surrounding the problems of atomic veterans, the House and Senate each passed bills addressing the V.A. claims adjudication process. The compromise between these two bills, which passed as P.L. 98-542, dropped the most effective parts of each. Unlike the original House version, P.L. 98-542 contains no legislatively mandated presumptions of service connection for the radiogenic disease of atomic veterans. Unlike the Senate version, P.L. 98-542 contains no provision for judicial review of the rulemaking process and its end result. The law did not even address the problem of genetic disorders among the children of atomic veterans and it provides no mechanisms for locating and counselling atomic veterans.

The regulations issued by the V.A. pursuant to P.L. 98-542 went into effect on September 25, 1985 (50 Fed. Reg. 34452 (Aug. 26,1985)). The procedure for the adjudication of the claims of atomic veterans outlined by these new regulations may prove to be an improvement over the previous system under which more than 99% of the claims of atmospheric nuclear weapons test participants were denied. There is, however, a fundamental defect in the regulations, partly due to the weak legislative mandate of P.L. 98-542.

Since Congress did not mandate the use of presumptions of service connection for radiogenic diseases of atomic veterans, the burden of proving to the V.A. the receipt of a harmful dose of radiation which caused the radiogenic disease is on the atomic veteran claimant.

A basic outline of the procedure laid out in the regulation is helpful in understanding the burden placed on the atomic veteran claimant. The claimant must first show that he participated in a nuclear weapons test, or in the occupation of Hiroshima or Nagasaki; that he was exposed to ionizing radiation; and that he contracted one of the 15 diseases that the V.A. has classified as radiogenic, within a specified period of time.

If the claimant does not initially establish the above three factors, the claim is dismissed. If the factors are established, the V.A. regional office must forward the claim to the Chief Benefits Director for review. The Chief Benefits Director must evaluate the claim in terms of several unweighted factors listed in Section 3.311b(e) of the regulations. These include the probable dose of radiation received by the veteran, the veteran's age, gender, age at exposure, and family history; the time lapse between exposure and onset of the disease; the relative sensitivity of the involved tissue to induction, by ionizing radiation, of the specific pathology; and the veteran's non-service related exposure to radiation or other carcinogens. The Chief Benefits Director must then determine whether "sound scientific and medical evidence supports the conclusion that it is at least as likely as not that the veteran's (radiogenic) disease resulted from exposure to ionizing radiation during service."

As outlined earlier, uncertainty abounds in the determination of the dose of radiation an individual may have received, and the scientific and medical communities have not conclusively determined the nature of radiogenic diseases and the pathologies involved. The atomic veteran bears the brunt of this uncertainty in the evaluation of his claim by Chief Benefits Director.

Instead of presuming that the radiogenic disease of a veteran who participated in military activities which caused him to be exposed to ionizing radiation, is service-related, the V.A. requires a lengthy evaluation of the claim based on inaccurate and incomplete information. This is patently unfair, particularly in light of the fact that the typical claimant is suffering from a fatal cancer, making the expeditious processing of claims crucial.

The regulations also provide that if the Chief Benefits Director is unable to make a determination regarding a claim, or if he makes a negative determination, the matter is referred to an independent consultant. The consultant must evaluate the claim on the basis of the same factors used by the Chief Benefits Director. The claimant still bears the burden imposed by the innaccuracy and incompleteness of dosimetry records and the uncertainty of the medical community regarding the pathology of radiogenic diseases. It should also be noted that the option to confer with an outside consultant has always been avilable to the V.A. , and has been used to the detriment of atomic veteran claimants.

S. 707

S. 707, introduced by Senator Paul Simon, would remedy the shortcomings of P.L. 98-542 and the new regulations. It outlines a fair, efficient and expeditious procedure for adjudicating the claims of atomic veterans while providing for the scientific, medical, and governmental uncertainties and innaccuracies attendant to such claims. The Bill presents a total approach to a problem that for far too long has been relegated piecemeal attention.

First and foremost, S. 707 would amend Chapters 11 and 17 of Title 38 of the United States Code and create presumptions of service connected for entitlement to compensation and health care for radiogenic diseases, disabilities and chromosomal damages of atomic veterans. Legislatively mandated presumptions streamline the adjudication process and make it more equitable. If a claimant participated in the nuclear weapons testing program, or in the occupation of Hiroshima or Nagasaki; was exposed to ionizing radiation, and contracted a radiogenic disease within a specified period, he will receive service-related compensation unless the government produces affirmative evidence that the disease was not caused by exposure to ionizing radiation.

The Bill mandates that the V.A. determine in regulations what diseases, disabilities and chromosomal damage are radiogenic, and the time periods in which they must become manifest in order for the claimant to obtain a presumption of service-connection.

Rather than requiring the V.A. to evaluate claims on the basis of incomplete or faulty information regarding radiation dosage and differing medical opinions, S. 707 requires the V.A. to presume the radiogenic disease is service-related unless there exists affirmative evidence to the contrary. Thus, the burden of proof is lifted from the sick claimant and put on the government, the keeper of records and information.

Second, S. 707 would provide for health care and educational assistance for the children of atomic veterans afflicted with congenital or genetic disorders or disabilities connected with the veteran's exposure to ionizing radiation. These victims of radiation have long been ignored by this country, which can be attested to by Senator Paul Simon, who, as a Representative testified before the House Veterans' Affairs Subcommittee on Oversight and Investigations on May 24, 1983 about his constituent, Atomic Veteran Bob Farmer, whose 9 children each have some genetic disorders despite the fact that genetic disorders are unknown on either side of the Farmer family tree.

Finally, the Bill provides for screening, counselling, outreach, and research concerning radiation exposure. To date, the only effort made by the government aimed at identifying and locating atomic veterans was a piecemeal public service outreach program coordinated by the Defense Nuclear Agency which accounted for less than one fifth of the total number of atomic veterans. The Bill would facilitate the use of the government communications specialists to identify these people and apprise them of their rights.

In terms of the budgetary impact of the passage of S. 707, it is important to note that atomic veterans are a finite group of people who will file a limited number of claims for compensation to be paid over a period of time limited to their lifetimes and those of their spouses. According to V.A. statistics, as of September 3, 1985, only 1,886 claims for service-related compensation have been filed by atmospheric nuclear weapons tests atomic veterans with diagnosed illnesses. We are not dealing with an issue of spiralling or uncontrollable costs. Even if the passage of S. 707 generated an additional 1,886 claims, which is highly unlikely, and assuming that all 3,772 fit the requirements for a presumption of service connection laid out in S. 707, which is even more unlikely, the impact on the budget would be slight. To reiterate, we are dealing with a finite group of possible claimants, a limited number of claims and a closed period of time.

As a whole, S. 707 provides complete and long overdue solutions to the host of problems common to the atomic veterans who patriotically served their country and met the needs of our National Defense.

The Warner Amendment

The Warner Amendment, Section 1631 of the Department of Energy National Security and Military Nuclear Energy Authorization Act of 1985 (codified at 42 U.S.C. § 2212), provides that any legal actions for injuries caused by radiation exposure due to the acts or omissions of Federal contractors shall be maintained solely against the United States under the Federal Tort Claims Act.

The Warner Amendment has a Draconian effect. It leaves atomic veterans injured through the negligence of Federal contractors during nuclear weapons tests with no legal remedy, and absolutely no hope of recovery. By operation of the Amendment, the United States is substituted as the party defendant in actions against nuclear weapons test Federal contractors, that is, the government stands in the contractors piece for liability purposes. It would seem logical and fair that the government only have the contractors' defenses available to it.

Unfortunately, this is not the case. The Warner Amendment provides that the United States may raise any defenses available under the Federal Torts Claim Act. A Supreme Court holding, known as the Feres Doctrine (Feres v. United States, 340 U.S. 135 (1950)), states that Federal Torts Claim Act remedies do not extend to "injuries to servicemen where the injuries arise out of, or are in the course of activity incident to service." Thus, the government has a complete defense to all suits brought by atomic veterans under the Warner Amendment, and the atomic veteran is left without judicial recourse

In August, 1985, a federal judge in the Northern District of California dismissed a group of cases brought by atomic veterans and their survivors. The basis for dismissal was the combined effect of the Warner Amendment and the Feres Doctrine. (In Re: Consolidated Nuclear Radiation Injury Litigation, U.S. District Court, No. C-84-0022-WWS (N.D. Cal. Aug. 28, 1985)). Mr. Gordon Erspamer, a San Francisco attorney whose atomic veteran father died from leukemia, was a plaintiff in the suit. He has prepared a statement, which is attached to my testimony, analyzing the decision, which he has called "the last nail in the coffin of the atomic veteran."

The _Feres_ Doctrine is based on the sovereign immunity of the United States government, yet the Warner Amendment operates to deprive atomic veterans of any judicial remedy against _private_ contractors on the basis of purely _governmental_ defense.

The Warner Amendment also acts to deprive the atomic veteran of his 7th Amendment constitutional right to a jury trial. In the absence of the Warner Amendment, a suit brought by an atomic veteran against a Federal contractor for negligence in nuclear weapons tests would undoubtedly be tried before a jury. Under the Warner Amendment, however, the same suit against the _private_ contractor under laws of the particular jurisdiction, becomes a suit against the United States under the Federal Torts Claim Act, which is by law, tried to a judge.

Additionally, the Warner Amendment bars the atomic veteran from utilizing the methods of fact finding available to any litigant. For example, since the government has a complete defense, the injured atomic veteran can never bring his own expert witnesses to the stand, or cross examine government witnesses to prove the facts and circumstances surrounding his injury.

In sum, Congress, in attempting to assume the liabilities of the nuclear weapons test Federal contractors to atomic veterans and others, either intentionally, or unintentionally denied any hope of recovery and denied the fundamental right to trial by jury.

There are at least two other ways to provide for the protection of these Federal contractors that would not kill any chance of recovery on the part of atomic veterans. NAAV strongly urges that the Senate consider each alternative.

First, Congress could repeal the Warner Amendment and suggest or require that the United States indemnify the contractors for damages, costs and fees resulting from suits arising out of the atomic weapons test program.

Alternatively, Congress could keep the Warner Amendment intact, but pass legislation requiring that in these suits, the United States have only those defenses that would have been available to the contractor who performed the test, and to allow plaintiffs the right to a jury trial, on request. The House is currently considering such legislation in the form of H.R. 1338, the "Boucher Amendment".

Neither of these alternatives in any way lessens the burden of proof to be borne by plaintiffs. Neither ensures that the injured atomic veteran will recover. If a plaintiff cannot establish the negligence of the Federal contractor, and the causative link between that negligence and his illness or injury, he will not recover. This is wholly consistent with our judicial system and our Constitutional heritage. The Warner Amendment represents an inequitable denial of fundamental rights and a perversion of the American system of justice.

Conclusion

If a soldier was hit by a bullet in the leg during service and suffers from a resulting disability, he is compensated by the

Veterans' Administration. If a seaman was injured aboard a poorly constructed Naval vessel, he can sue the Federal contractor whose negligence caused the injury. When Vietnam veterans developed delayed reactions to Agent Orange, they sued the chemical companies that manufactured the defoliant for the Federal government, and obtained settlement (In Re: Agent Orange Product Liability Litigation, U.S. District Court, No MDL 381 (E.D.N.Y. Oct. 1984)).

Atomic veterans seek to be treated in the same ways as other veterans who honorably served their country. They want the same rights and remedies. In short, atomic veterans seek no special favors, simply justice.

Thank you.

ATTACHMENT

STATEMENT OF GORDON P. ERSPAMER

1. I am a member of the law firm of Morrison & Foerster and have been actively involved concerning atomic veterans' issues for over five years. I am on the Legal Advisory Board of the National Association of Radiation Survivors, and Vice-President and member of the Board of Directors of Crossroads 40, a non-profit corporation recently formed to commemorate the 40th anniversary observance of Operations Crossroads through a coalition between the people of Bikini Island and the atomic veterans who participated in Operations Crossroads. In addition, I am counsel of record for the plaintiffs in National Association of Radiation Survivors v. Walters, 589 F.Supp. 1302, reversed _______ U.S. ________ (1985), an action challenging the constitutionality of the $10 limit on attorneys' fees applicable to Veterans Administration claims, which was decided by the U.S. Supreme Court last term.

2. I make this brief statement to analyze the impact of Judge William Schwarzer's recent decision upholding the constitutionality of Section 1631 of the Department of Defense Authorization Act of 1984 on the ability of atomic veterans to obtain compensation for the deaths, injuries and illnesses they have suffered as a result of their participation in atomic bomb tests.

3. Under previously existing law, veterans have been precluded from suing the government for any injuries suffered in service as a result of the Feres doctrine, subject to one limited exception known as the "post-discharge failure to warn" theory. Veterans were otherwise limited to the

administrative claim remedy before the Veterans Administration for service-connected deaths or disabilities. Unfortunately, the ultimate success rate, which includes exhaustion of all appeals, for atomic veteran Veterans Administration claims has been substantially less than 1%. To date, no post-discharge failure to warn suit against the government has ever been successful, although several were scheduled to be tried this year. Similarly, none of the approximately 100 suits by atomic veterans or their families against private contractors has ever reached trial. Thus, the situation existing prior to Judge Schwarzer's recent decision regarding the constitutionality of Section 1631 was that only a small handful of atomic veterans had ever been compensated in any way for the deaths, diseases and injuries arising out of their participation in the atomic bomb testing. This is true despite Congressional attempts to relax the proof requirements concerning atomic veterans' claims through the use of presumptions and other means.

4. Judge Schwarzer's recent decision, if upheld, will completely preclude the ability of atomic veterans to obtain redress against private contractors on any theory or the government under the post-discharge failure to warn theory. Judge Schwarzer has dismissed all the private contractors from the consolidated cases before him, has substituted the government as the only defendant, and has dismissed the government relying upon the Feres doctrine, the discretionary function exemption to FTCA and a host of other government immunities and defenses. Judge Schwarzer dismissed the post-discharge failure to warn suits originally brought against

the government, ruling that the decision whether to warn or not to warn would be a discretionary function, regardless of whether the matter was even considered, and therefore falls under the discretionary function exemption to government liability under the Federal Tort Claims Act. If upheld, Judge Schwarzer's decision would dictate the dismissal of all post-discharge failure to warn suits against the U.S. government. As a consequence of Judge Schwarzer's decision, atomic veterans will be left with only one possible remedy -- the Veterans Administration claim remedy -- which thus far has seen only 15 of over 4,000 atomic veterans receive any compensation over the last two decades. Our information indicates that all 15 veterans are dead, and therefore, their families receive compensation of only a few hundred dollars a month.

5. Congress must act quickly if atomic veterans are ever to receive compensation for the drastic health effects caused by the atomic bomb testing program. Many atomic veterans have already died, often leaving their families destitute. Many others are totally or partially disabled. In my view, our nation's disregard for the plight of the atomic veteran is one of the great injustices of our age. I strongly urge you all to support legislation to eliminate this scourge on the national conscience.

Dated: September 5, 1985

Gordon P. Erspamer

Senator **Matsunaga**. We shall hear now from—who will be next?

Dr. **Legarreta**. I will be next.

Senator **Matsunaga**. Dorothy Legarreta.

STATEMENT OF DR. DOROTHY LEGARRETA, ADMINISTRATIVE DIRECTOR, NATIONAL ASSOCIATION OF RADIATION SURVIVORS

Dr. **Legarreta**. I would like to thank you, Senator Spark Matsunaga, and the other members of the Senate Veterans' Affairs Committee for the opportunity to present both oral and written testimony reflecting the experience of the members of the National Association of Radiation Survivors.

I wish to add that our legislative director, Fred Thompson, right behind me, would ordinarily be addressing this group, but I am pinchhitting for him today.

I am going to very briefly highlight the key points that our membership, which includes atomic veterans, civilians like myself who worked in nuclear establishments, downwinders, test site workers, Japanese-American Hibakusha, uranium miners of many ethnic groups, Navajo, Pueblo, Chicano, Anglo, who we all consider radiation survivors, their key points on the issues before us.

First of all, the August 25, 1985, VA regs for adjudication of ionizing radiation exposure claims. We want to comment that we are very pleased that the VA said today that they are going to take the responsibility of sending around to all the claimants for ionizing radiation illnesses who have been denied, or whose claims are pending, including many, many atomic widows, the certification of the new regs, urging them to reapply and refile their claims. We think that is excellent. That was going to be our bottom line that they had to do the actual disclosure to the population who needs this new information.

But we do want to comment that over the last 5 years even with a series of changes in the VA regulations including the new addition of 14 radiogenic cancers, we still find that the VA in its hospital practices does little more than a cursory 15-minute physical for service men and women coming in claiming radiation exposure.

There has been very little change on the hospital level in spite of the plethora of new VA regulations.

I also want to comment that the range of radiogenic illnesses that the VA presently compensates, although a great jump from the former list, is still inadequate. The Biological Effects of Ionizing Radiation [BEIR] III Committee, way back in 1980, added another eight radiogenic cancers that the VA in 1985 does not see fit to add. These cancers should be added as well.

We would like to comment also that all medical research shows that there are a series of processes other than the tumorous processes that cause cancer, going on in people exposed to radiation. Such things as posterior sub-capsular or cataracts—we have some veterans with those here today—are caused by radiation.

Sterility is obviously caused by radiation. That is not on the regs. Birth defects we are going to talk about in a minute.

We suggest, the list of radiogenic illnesses that the Japanese Government, after 40 years of research, has granted compensation to every person who was within range of the bombs in both Hiroshima and Nagasaki. That list is appended to our testimony,[1] in both Japanese and English; and we urge that the VA use that list, which, as I say, is the result of 40 years of research, as the list of disease processes—illnesses that are compensatable by the VA.

We also want to very strongly reject the Radio-Epidemiological Risk Tables that the VA plans to base adjudication upon.

These Radio-Epidemiological Risk Tables were prepared by Government scientists without peer review; there was no public hearing on these tables, and we find that they seriously underestimate the probability of causation of any cancer with any given dose of radiation; and we totally reject them.

Finally, we welcome the admission of dose reconstructions by other than the Defense Nuclear Agency, which everyone knows are totally meaningless from a variety of testimony you have already heard.

We are glad that the VA is now going to admit dose reconstructions from qualified health physicists. We have had a number of these dose reconstructions done for veterans. They cost upward of $750–$1,000. Terminally ill atomic veterans cannot afford this kind of a dose reconstruction.

We suggest alternatively that our Government do precisely what the Canadian Government has already done to servicemen who were exposed at places like the Nevada test site. Canadian soldiers were down there getting nuked too.

The Canadian Government has already compensated anyone who can prove or said he was at a nuclear test site, either in our country, in Australia, or in the Pacific. We should do as well for our servicemen.

Let me move now to S. 707. We heard some very excellent testimony about it. The National Association of Radiation Survivors supports wholeheartedly this excellent piece of legislation.

We have a couple of caveats. First of all, 40-years latency is not supported by the medical literature to date on radiation illness. Some of the Japanese survivors are only now coming down with illnesses traceable to radiation.

Second, we are very glad about the presumption, and we wish that the VA would use the same techniques for presumption.

Third, I want to put in a very sincere word for our atomic widows. We have heard over and over that the veterans are dying. Well, the widows are still here. Our widows' representative, Jean Ralph, is here to answer any questions about widows' DIC benefits.

Also, the atomic children are here in force today. Felice Fond will talk about atomic daughters. They are not going to go away either, even when their fathers or mothers are dead.

So, we would like to have the DIC benefits increased. In the Simon bill, for the first time, and in the Evans bill, its counterpart in the House, we find attention finally being paid to genetic problems in offspring of atomic veterans.

However, we note that the chromosome studies which are suggested in the Senate 707 legislation are not adequate. These chromosome studies must be done gratis to an atomic veteran with a genetically affected child or, in the case of Mr. Bob Farmer, nine genetically affected children.

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[1] See p. 194.

They cost upward of $500. Some of the veterans sitting in the audience have had them. They are very expensive. If the VA does them, we insist on split samples with part of the lymphocytic blood going to an independent laboratory; and then we will compare the results.

Finally, on the 707, we are very pleased that the present DNA dose reconstructions are termed meaningless and should be unnecessary, and again we refer to the Canadian model of adjudication, where you get the money if you have been there.

Now, I would like to talk a little bit about the Warner amendment. I worked at the University of California when I was 17 and 18 at the Crocker Radiation Lab, which was under the Manhattan Project, and I am here to tell you that when I was working there—I worked under a very talented scientist who was doing metabolic and excretion experiments with a newly discovered compound, or element that was discovered at my lab (we had the biggest cyclotron in the world in 1944 and 1945)—at Crocker Radiation Lab.

We developed Plutonium, and my boss, Dr. Joseph Hamilton used Plutonium, Strontium, radioactive iodine and Americium, et cetera, to do experiments with animals, when I was working there. I worked with those animals.

However, in 1945, Dr. Joseph Hamilton began to use these same substances in humans. I come from Sonoma County, CA—wine country—and a house painter up there was given Plutonium to ingest, and Dr. Hamilton monitored his excretion.

A group of old indigent people at the Laguna Honda Home in San Francisco were given Strontium 90 to ingest, and their excretion was monitored.

We did a Freedom of Information Act to the Department of Energy asking for every study which included ingestion or injection of radionuclides in humans. We got a box back that big. [Indicates 24 inches high.]

I have gone through a third of it, out in Oakland. The same box is here at the DOE reading room if any of you want to go through it. It is frightening. The first one-third of the documents—and they are in the bibliography for our testimony—document nearly 500 patients or clients, or guinea pigs, or human subjects who were injected or given these substances, these highly toxic substances, like Plutonium, Strontium, et cetera, to ingest.

They were not told that it was dangerous; they were not given any information. These studies went on at some dozen university sites, and I am afraid that one of the reasons the University of California wrote the Warner Amendment back in 1983 was that they did not want to be embarrassed by what went on at their lab by their people.

In any case, these studies are out in the literature now. They are available at the DOE Reading Room, and this continued not just in 1945, but all the way up to 1972. They started under the Manhattan project. They went on under the AEC; they went on under ERDA, and they went on under the DOE, and I want to stress that the people they chose were prisoners, women with emotional problems, blacks, alcoholics, and old folks, in old folks' homes, and in university hospitals.

In fact, one of the experimental subjects of these 476 was still alive 2 years ago. None of these people or their survivors can ever file suit for human experimentation because of the Warner Amendment, and I do want to stress that these experiments with humans—these human guinea pigs went on long after the Nuremberg trials in which the Nazi doctors were indicted for human experimentation, and a series of protocols for the protection of human subjects were accepted internationally and our Government has been under those protocols since 1947.

In spite of this, this human experimentation went on at a number of university labs.

I do want to move on a little--but first I am going to talk about what Joe Hamilton said in 1950. He wrote a letter to a colleague, Dr. Shields Warren, who was one of the big shots in the AEC, saying that "These experiments had a touch of the Buchenwald about them." And he was quite true. They were human experiments of the worst type.

I want to move to some more human experiments—the Crossroads experiments in 1946. Dr. Joe Hamilton was in charge of radiological monitoring of the Bikini Lagoon, and when the 120 radiologically contaminated ships came back to San Francisco and Bremerton, and along the Coast, he was in charge of decontaminating those ships.

The University of California was totally immersed in all of this. The contract started in 1942, and went on. The Warner Amendment is not needed, because any lawsuits against UC-Berkeley or AT&T or Sandia are already taken care of by the indemnification agreements that were entered into in 1942 with these suppliers.

They are not necessary to save any money for the universities or other labs. They are necessary for these scientists to save face; and that is simply it.

I am going to conclude my testimony by saying that 300 lawsuits have just been dismissed—50 on the west coast, primarily atomic widows whose husbands were at Crossroads; a few civilians; 250 more suits at Las Vegas from test site workers' widows—these men were right there when the bombs were going off, just like Jim was.

We can talk about what it does to people, but I want to talk a little bit—and Felice is going to talk about what this kind of human experimentation with the guinea pigs in the labs and the guinea pigs out at the Nevada test site and the Pacific has done to families.

So, I am going to turn it over to Felice.

Senator MATSUNAGA. Thank you, Dr. Legarreta.

[The prepared statements of the National Association of Radiation Survivors follow:]

NATIONAL ASSOCIATION OF
RADIATION SURVIVORS

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STATEMENT OF THE NATIONAL ASSOCIATION OF RADIATION SURVIVORS ON THE WARNER AMENDMENT

PRESENTED TO: Senator Frank Murkowski, Chair, Senate Veterans Affairs

HEARING: Thursday, November 14, 1985

THE WARNER AMENDMENT: A LICENSE TO KILL

Thank you for the opportunity to present written testimony before the Senate Veterans Affairs Committee on behalf of the members of NARS. We would like to preface this statement with the reminder that the purview of the Veterans Affairs Committee does not include the thousands of civilians injured by the Nuclear Weapons Program, and, therefore, we believe that it is quite inappropriate for the hearings on the Warner Amendment to be before this committee, particularly inasmuch as House testimony was before the House Judiciary Committee. We submit that the proper forum for the Warner Amendment hearings in the Senate would be the Senate Judiciary Committee.

My name is Dorothy Legarreta; my exposure to ionizing radiation took place during the Manhattan Project at its site at the Crocker Radiation Laboratory on the University of California campus at Berkeley (UCB). This lab had the largest cyclotron in the world between 1942-48, and it was put to use in devising"wartime offensive uses of radionuclides", according to contracts between UCB and the Manhattan Engineer Corp (Manhattan Project), dated 1942-43. I am noting this background because it is relevant to the material below which NARS has prepared on the Warner Amendment, a law shich we characterize as a "License to Kill".We believe you will appreciate why

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we use this terminology as you read this statement, in particular the first section, which comments on Section 1631 of the 1985 Department of Energy Funding Authorization, also know as the Warner Amendment, codified into law as 42 U.S.C. 2212. The balance of this testimony will deal with certain materials on Operation Crossroads, Bikini, 1946, which may be of use to this Committee whenever the General Accounting Office Report on Crossroads, drawn from the Stafford Warren papers and tapes, is made public .

As Professor William Fletcher's testimony before you so thoroughly demonstrates, and as Felice Fond and her family, here present, can underscore from personal experience, the Warner Amendment has already effectively precluded atomic veterans, their surviving spouses and offspring, from bringing causes of action for radiation injury in state courts against the contractors in the Nuclear Weapons Testing Program, back to the Manhattan Project, retroactive for over forty years. In addition, any lawsuit by *civilians* injured in the testing program, or their survivors, is also effectively barred from redress in state courts. No longer will the right to trial by jury and the possibility of punitive damages be available to any of these plaintiffs, past, present or future. Cases will now be heard only in Federal court, and the Government will be substituted as the sole defendent. Thus, the special defenses of sovereign immunity and the discretionary function have become available to the Government, as well as the *Feres* decision, prohibiting suits by veterans or their families. How does this confer a "license to kill" which NARS contends the Warner Amendment explicitly allows? The three paragraph amendment--the Warner bill--states the following:

> This section would provide a remedy against the United States for injury, loss of property, personal injury, or death due to exposure to radiation on *acts or omissions* by a contractor, carrying out atomic weapons tests under contract with, and under the direction and control of, the United States.
>
> "Contractor" also includes facilities which conduct or have conducted research concerning *health effects of ionizing radiation* in connection with the testing under contract with the Department of Energy or its predecessor agencies.

NARS contends that the research on the health effects of ionizing radiation was, in many cases we will enumerate below, human experimentation done without the consent or knowledge of those used as guinea pigs, and expressly prohibited by the rules for protection of human subjects which came out of the Nuremburg trials of the Nazi doctors in 1946-7.

What were the human experiments which contractors in the Nuclear Weapons Testing Program carried on as part of the health effects research? I will begin by referring back to the laboratory where I worked in the mid-forties. My boss was Dr. Joe Hamilton. He was in charge of extensive experiments on transuranic elements, such as Uranium, Plutonium, Americium, Cesium, Strontium, Polonium, and other radionuclides which would be released during the fission attendent on atomic bomb detonations. Dr. Hamilton was a genius in devising trials with rats and similar lab animals, both on how they metabolized these new substances, and what their excretion patterns were. His pioneering results were basic to the way science viewed how these elements behaved in living systems. However, by 1945, Dr. Hamilton began to undertake similar experiments with humans. He first used Plutonium, which had first been produced at my lab, and Strontium, both very toxic substances. Correspondence in the Ernest O. Lawrence Collection at UC-Berkeley's Bancroft Library details how he fed Strontium to several aged indigents at the county old peoples home in San Francisco, calling it "treatment". (1) The letters describe how he kept these activities from the UC-Medical School Clinical Director, Dr. Soley, whom he described as "an individual of more than average ability and I think he would soon realize that something very peculiar was going on". (1) Dr. Hamilton also induced a middle-aged housepainter from my home county in California to ingest Plutonium, and he monitored this man's excretion--to put it crudely, "hot shit". (2). When the housepainter, Mr. Stephens, made plans to leave Healdsburg, in northern California's wine country, Dr. Hamilton agreed to pay him $50 per month--the equivalent of some $400 a month today--to stay put, and continue to collect his excreta for assay. The correspondence details the problem of who would pay the stipend to Mr. phens, as clearly, the Manhattan Project of the United States Army did not want him on its payroll. Dr. Hamilton was able to place him on the payroll of Crocker Radiation Lab, in mid-1945, in a special category.

Through a Freedom of Information request, NARS has obtained many documents which tell of lengthy human experiments under Manhattan Project auspices, then the Atomic Energy Commission, then Energy Research and Development, and finally, the Department of Energy. In these studies, performed upon alcoholics in charity hospitals, indigent blacks, women with "emotional problems", and physically-compromised hospital patients, injections or oral administration of Plutonium, Strontium, Polonium, Uranium, Tritium, and other radionuclides were administered to ascertain how the human body metabolized and excreted these compounds. Other persons were subjected to extremely high doses of radiation to find out how their immunological defenses responded to this cell damage. These human experimental subjects were not told of the procedures done to them, and many were not even followed after these "treatments", as laboratory animals invariably are. It is important to repeat that these studies, some ten in all, continued well after the international protocol for the protection of human subjects, a result of the Nuremburg Trials, had been accepted by the United States. Dr. Hamilton did note, in discussing his human experiemnts with a letter to a colleague in 1950, that such studies had a "little of the Buchenwald touch". (3)

How many of our citizens were damaged by these experiments undertaken by prominent researchers under contract to our Government? NARS, in a partial review of the documents from the Department of Energy obtained under a Freedom of Information Act request, has determined that at least 64 persons were involved in the ten studies. (4), (5), (6),(7),(8),(9), (10),(11),(12),(13),(14).

In a lengthy review of an additional set of three long-term studies of the health effects of ionizing radiation, Robert Alvarez of the Enviornmental Policy Institute, finds an additional total of 412 persons who were damaged by similar experiments, again done without the subject's consent or knowledge. At the University of Cinncinnati, the AEC funded a longitudinal study involving intense whole-body radiation on 87 charity patients in a local hospital. This research cost some $700,000, and lasted until 1971.(15) A second study, from 1953-73, featured the irradiation of the testicles of prisoners in Oregon and Washington. Both the AEC and NASA wanted to determine how much radiation would sterilize a male, and how long this sterility would last. Potential astronauts were understandably concerned about such effects. All the 131 subjects did become sterile, and some had to have their testicles removed because of cancer caused by the irradiation. (16) Another large study on humans at Oak Ridge National Laboratory from 1960-75 irradiated 194 persons, all suffering from various cancers.This study cost some four million dollars but produced no useful results. Overall, at least 476 persons were used as guinea pigs in these bizarre human experiments. (17)

Let us return to Dr. Joe Hamilton and an astronomically larger series of human experiments, the Nuclear Weapons Testing Program. One of the very first, and largest, of these was Operation Crossroads, at Bikini Atoll, in 1946. In this series, over 42,000 men, mostly young sailors, were exposed to potentially harmful levels of radiation. Dr. Joe Hamilton was there to monitor the Bikini Lagoon, which became filled with fission products from the second detonation, the underwater shot, "Baker". After "Baker", Dr. Stafford Warren, head of Radiological Safety, found that over 120 ships, the whole lagoon, and the island, were contaminated to dangerous levels. He cancelled the third proposed shot,"Charlie", and attempted damage control. The Stafford Warren papers, from the UCLA Library, and his Oral History, from the same source, leave no doubt that the whole operation was a fiasco, as do the documents appended from the E. O Lawrence collection dealing with Crossroads. (18)

After Crossroads, the onerous and ultimately futile process of ship decontamination on the 120 ships began, again supervised by Dr. Joe Hamilton. Dr. Warren went on to become thefirst Dean of the new medical school at UCLA. He won a series of Government contracts to monitor the off-site radioactive fall-out from all the Nevada atomic tests from 1951 until the early sixties. This central role of the University of California in the Nuclear Weapons Testing Program is well characterized in the Reply Brief in the Consolidated Cases against UCB recently dismissed as a result of the Warner Amendment:

> These private contractors were the very heart of the United States Testing Program. Defendamt University of California virtually created the program single-handedly by its establishment and management of the Manhattan Project. (Regents Statement 2:16-3.2) Th University has operated the Los Alamos and Livermore nuclear Weapons Laboratories for the United States since World War II.During that period, the university has participated in the design and testing of nuclear devices. Sandia Corporation, a subsidiary of defendant AT&T Technologies, formerly Western Electric Co., has operated SAndia National Laboratory for the United States since 1949 and has been responsible for the designe and development of nuclear weapons housomgs amd nuclear ordnance. Defendant Reynolds Electrical & Engineering Co. has been responsible for maintenance, operation, and construction of test facilities.
>
> page 4, Plaintiffs MFA

Clearly, this role brings us to the Warner Amendment, which NARS understands was actually written by attorneys for the University of California, Berkeley. What this amendment does is make is impossible fo any of the 476 persons described above, or their survivors, to gain redress for their injuries or wrongful death. Furthermore, not one of the 250,000 servicemen and women exposed to aboveground tests can sue UCB or any other contractor who gave the Government poor advice concerning radiological safety.

NARS now has positive proof that the Government knew at the time of Crossroads at Bikini in 1946, and for all subsequent nuclear tests, that the exposure to radionuclides was dangerous, that the men were, in fact, guinea pigs. This statement, from the Government reply brief:

> Crossroads orgazizers were generally aware that overexposure, especially to Plutonium, could result in long-term health problems which would not be immediately apparent.
> Since the Government knew of these hazards in 1946, any tort involved in its alleged failure to warn servicemen arose when they were exposed, and these suits are barred by Feres.
>
> Page 35, US Reply Brief
> Suit C-84-0022-WWS

To conclude, we respectfully urge that this Committee work to repeal the Warner Amendment to restore to those exposed to ionizing radiation the right to justice.

The National Association of Radiation Survivors

Dorothy Legarreta

Dorothy Legarreta, Ph.D.
Administrative Director

BIBLIOGRAPHY OF STUDIES ON HUMAN INJECTION WITH RADIONUCLES FROM FOIA REQUEST (Partial)

4) S. Bassett, et al, The Excretion of Hexavalent Uranium Following Intravenous Administ ration: Studies in Man, U. or Rochester, 1948

5) S.R. Bernard, et al, The Distribution and Excretion of Uranium in Man, Oak Ridge National Laboratory, 1956

6) C. DeLong, et al, Percutaneaous Absorption of Tritium Oxide, General Electric, University of Washington, Pullman, 1954

7) R. M. Fink, Biological Studies with Polonium, Radium, Plutonium, Van Nuys Veterans Hospital/U. of Rochester, 1950

8) J. B. Hursh and J. Soumela, Absorption of 212 Pb from the Gastrointestinal Tract of Man, U. of Rochester, undated

9) Wright Langham, The Distribution and Excretion of Plutonium Administered Intravenously to Man, Los Alamos, U. of Rochester, 1950

10) N. S. MacDonald, et al, Radiostrontium Metabolism in Humans, not dated

11) J. J Nickson, Blood Changes in Humans Following Total Body Irradiction, Billings Hospital, 1949

12) E. Pinson, Ingestion of Tritiated Water in Man, Los Alamos National Lab-
1952

13) H. E. Silberstein, et al, Studies of Polonium Metabolism in Human Subjects, 1950

14)
There were also two studies of the use of radioactive Fe in a ies to measure to plasma ion turnover done at the U. of Washington School of Medicine under AEC auspices, using a total of 129 subjects. Two studies of Erythrokinetics using radionuclide injections were done on four children at Children's Hospital at the U. Of Washington. The children were aged 4-13.

15) E. Saenger, et al, Metabolic Changes in Humans following Total Body Irradiation, University of Cinncinnati (DASA, 1633)

16) Tom Read, "Prison Radiation Tests Completed", Seattle Post-Intelliggencer, March 3, 1976

17) G.A. Andrews, C.C. Lushbaugh, et al, Hemotologic and Therapuetic Effects of Total-Body Irradiation (50-100R) in Patients with Malignant Lymphoma, Chronic Lymhpcitic and Granulocytic Leukemia and Polycythemia Vera, (IRAU-112)

18) List of Overexposed Ships from Bikini

FOOTNOTES

[1] Following are the actions brought by or on behalf of servicemen and the dates and locations of their radiation exposure:

Action	Plaintiff	Test	Year
Japan Detonations			
83-2989 84-3210	Molsbergen	Nagasaki	1945
84-2785	Minarik	Hiroshima/Nagasaki	1945
83-0309 83-1291	Solano	Hiroshima/Nagasaki	1945
Pacific Detonations			
82-1405	Beaman	Crossroads	1946
82-5902 83-0008	Benson	Crossroads	1946
82-6372 83-0009	Carsillo	Crossroads	1946
83-2248	Collins	Crossroads	1946
83-0308 83-1292	Cordray	Crossroads	1946
83-3061	DeMuth	Crossroads	1946
84-3259	Erspamer	Crossroads	1946
82-6494 83-1289	Estes	Crossroads	1946
83-0188 83-1290	Ferguson	Crossroads	1946
83-4848 84-0310	Guarisco	Crossroads	1946
83-4849	Milne	Crossroads	1946
83-4847	Paskett	Crossroads	1946
82-3115	Saraiva	Crossroads	1946
83-4496	Van Winkle	Crossroads	1946
82-5812	Williams	Greenhouse	1951

83-0945 83-5758	Blake	Castle	1953-54
83-4842	Porambo	Castle	1954
83-1391 83-3051	Dixon	Redwing	1956
83-4844	Fassett	Dominic II	1962

Nevada Detonations

81-0734	Konizeski	Ranger and/or Buster/Jangle	1951
81-1511	Sanders	Ranger and/or Buster/Jangle	1951
82-4845	Fond	Upshot Knothole	1953
83-4841 83-5402	Hoffmeister	Upshot Knothole	1953

In addition, decedent Smith allegedly participated in the Ivy (1952), Castle (1954), and Hardtack I (1958) tests in the Pacific as a serviceman, and in the Dominic I test in the Pacific as a civilian. Harrison v. United States, 83-5307.

[2] Following are the actions brought by or on behalf of civilian plaintiffs and the dates and locations:

Action	Plaintiff	Test	Year
Pacific Detonations			
84-2468	Green	Greenhouse	1951
82-3116	Stephens	Castle	1953-54
82-3114	King King King	Castle Wigwam Hardtack I	1954 1955 1958
85-2138	Hinkle	Redwing	1956
Nevada Detonations			
83-5642	Ryder	Unknown	Unknown

See also Harrison v. United States, 83-5307, cited in note 1 supra.

[3] Contractors named as defendants include the University of California, American Telephone and Telegraph Company (including its affiliates Sandia Corporation, AT&T

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3. R. S. Stone (CL)
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January 30, 1945

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CLASSIFICATION CANCELLED
DATE 12-29-67
For The Atomic Energy Commission
H. F. Carroll TC
Chief, Declassification Branch

Dr. J. G. Hamilton,
P. O. Box 528
Berkeley, California.

Dear Dr. Hamilton:

On the occasion of our last Health Meeting, I spoke to you about the question of Iodine being given to the personnel at Hanford with a view to keeping the gland flooded with Iodine. As you will recall, the question came up as to whether relatively large doses of some iodide could be given at monthly intervals and hope to keep the thyroid gland saturated, or whether it would be necessary to give 100 milligrams each day, as you suggested in your report, CH-2257.

You will recall that in that report you stated that "normal human subjects, when Iodine without carrier was administered by mouth, the 20% which accumulated in the thyroid was retained for many weeks without significant loss." If this is true for other Iodine, it may be that once a month is sufficient.

Experiments are, therefore, in order to see whether thyroid once loaded up with Iodine will retain it to such an extent that even tracer amounts of radio-iodine would not be taken up by the individual in the period between receiving the flooding doses. Your experience with Iodine studies makes you pre-eminently qualified to carry out this further study and it might be that you could, through Dr. Soley, do some human studies along this line without exposing to him the reason for the studies being done at this time.

You mentioned, when we discussed this, that you would need some radio-iodine. I believe it will be possible for you to get that from the Clinton Laboratories, but the request will have to be made in the regular way through your Area Engineer, to the Area Engineer here. That will of course be the official channel of request. I would suggest that direct contact be made through Mr. Doan with Waldo Cohn, who is now in charge of this type of work.

I hope that you can undertake this before too long a period of time, since the desire for the result is rather accute.

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Yours sincerely,

Robt. S. Stone

Robert S. Stone, M. D.

RSS/w

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February 6, 1945

Dr. R. S. Stone
Metallurgical Laboratory
University of Chicago
Chicago, Illinois

Dear Dr. Stone:

I have made the necessary request, both through Mr. Fidler and Doan and Waldo at the site, for the radioactive iodine. We will start the experiments as soon as the material arrives, and will attempt to give you the answers as soon as possible.

Human studies, would, of course, be very desirable under the conditions you suggested namely the use of clinical material at U. C. Hospital with the collaboration of Dr. Soley. There are, however, a couple of difficulties in the mode of approach which present themselves. In the first place Dr. Soley is an individual of more than average ability and I think he would soon realize that something very peculiar was going on. * In the second place he is not qualified by experience to operate the counting apparatus for the calibrations that would be necessary. In view of these two situations I think a better plan would be to run off a few normal controls, if you think the results with animals are not conclusive, with some of the people here. Otherwise considerable time will be lost by setting up the necessary installations in San Francisco, the time involved in traveling back and forth, etc.

I trust I will see you shortly, and at that time we can discuss this in greater detail.

Sincerely,

JGH/r

J. G. Hamilton, M. D.

July 7, 1945

CLASSIFICATION CANCELLED
DATE 12-29-67
For The Atomic Energy Commission
H. F. Carroll
Tc
Chief, Declassification Branch

Robert S. Stone, M. D.
Metallurgical Laboratories
P. O. Box 5207
Chicago 80, Illinois

Dear Doctor Stone:

I am writing concerning our experimental subject, Mr. Stephens, * who was given the 50 micrograms equivalent of Pu238 approximately two months ago. This man has formerly been a painter by trade but due to his illness, his economic condition is somewhat difficult, although I believe he owns his own home in Healdsburg, California. Kenneth and I are very much afraid that the man may sell his house and go to live at some distant point which would, of course, put an end to our most interesting series of experiments. This proposal may be totally irregular and out of keeping with army policy but since we have, to date, maintained daily collections of all excretions, it would seem most unfortunate not to have the assurance of his continued presence within a reasonable distance from Berkeley. I think this end could be accomplished if we could pay the man fifty dollars per month. However, there are possible legal and security situations which may present insurmountable obstacles. For this reason, I am telling you about the situation and also informing Colonel Warren by a copy of my letter to you. I certainly feel that if the legal and security requirements of the army can be met, the continued studies on this man, who, at present, is very nearly a normal individual, would be of inestimable value to the problem at hand concerning the metabolism of Plutonium in man. If you have the opportunity, I would appreciate it if you could discuss this situation with Colonel Warren and see what suggestions he may have to offer. I hate to toss a problem like this in your lap but I am afraid to stick my neck out unless I have some official blessing.

Colonel Warren will be interested to know that his U^{232} bombardment is under way. You will both be interested to know that we are devoting considerable time and energy to unraveling the causes for the anomalous behavier of the U^{232} produced by the cyclotron at the present high energy as reported to me by Spedding and his associates at Ames.

There is very good evidence to suggest the presence of decay products from the Uranium solution which are beta active and decay to a relatively short-lived alpha period. We are not yet prepared to say whether this is due to branch decay of U^{232} or what the origin may be. It appears to be greater than the decay products of the U^{232} itself. However, it is necessary to work this matter out once and for all or some spurious results may be obtained in the tracer studies. I feel quite sure that this effect will not destroy the usefulness of U^{232} as a tracer but it might be necessary to allow samples to age for a few days to a week or do some other equally simple procedure. This problem is definitely not due, in my estimation, to any contamination of the U^{232} by fission products, protoactinium or Thorium.

Page Two
To: Robert S. Stone, M. D.
From: Joseph G. Hamilton, M. D.

Another question of possible interest to both of you is the fact that Kenneth Scott has developed a better method of large scale removal of Product from biological material. The entire procedure, with the exception of ashing the urine and feces, can be accomplished within an hour and avoids the troublesome contamination of the final isolated sample from alpha periods in Lanthanum, Zirconium, etcetera. He is now in the process of writing up the procedure and I will see that it is distributed to those interested.

He has also checked the urines of Cannick, Hamacker, Kosha, McVey, King, and Koch. Twenty-four hour urine samples have been counted and the entire output of Plutonium ranged from .004 to .0185 counts per second, including background. The background of the counter plus chemicals gave blank values of .004 to .020 counts per second so as a result, I think we can conclude that these individuals are not contaminated with more than 0.1 microgram of Plutonium and probably much less.

With very best regards,

Joseph G. Hamilton, M. D.

JGH:wzm
cc: Colonel Stafford L. Warren

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CLASSIFICATION CANCELLED
DATE 12-27-67
For The Atomic Energy Commission
H. F. Carroll
Chief, Declassification Branch

12 July 1945

Subject: Status of Experimental Subject.

To: The Area Engineer, California Area, Berkeley, California

1. In reference to telephone conversation between Dr. Joseph Hamilton and the undersigned on 10 July 1945, a statement was made by Dr. Hamilton that the subject who received compound Pu28 may transfer out of that area because of financial embarrassment. *

2. Doctor Hamilton suggested that in some way he thought that it would be wise to give said individual some remuneration for his part in the experiment. By so doing present studies can be continued to completion.

3. Possible solutions to this problem could be:

a. Pay for his care in a hospital or nursing home as a service.

b. Place this individual on Dr. Hamilton's payroll in some minor capacity without release of any classified information.

4. It is not recommended that he be paid as an experimental subject only. *

5. Doctor Hamilton states that his budget is adequate to cover this service.

6. Arrangements for this should be made between Dr. Hamilton and your office. It would be appreciated if a statement of the final arrangement arrived at could be forwarded to the undersigned at this office.

For the District Engineer:

9

CC/ Dr. Joseph Hamilton

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JOE W. HOWLAND
1st Lt., Medical Corps
Assistant

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November 28, 1950

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James T. Davis APR 2 3 1974
SAN Classification Officer

Shields Warren, M.D., Director
Division of Biology and Medicine
U. S. Atomic Energy Commission
1901 Constitution Avenue
Washington 25, D. C.

Dear Shields:

Unfortunately, it will not be possible for me to be at the meeting on December 8, but I am passing along some of my ideas in the hope that they will be of some assistance to you and the others present at the conference.

To summarize briefly, in my estimation the biological equivalent "r" of 50 "r" of 1 Mev total body x-radiation* will probably provoke an appreciable, but not alarming degree of radiation sickness when given in a single dose. In other words, it would be my estimate, which is somewhat arbitrary as you must realize, that in the range of 25-50 "r" I would not anticipate a serious decrease in operational effective-ness of military or civilian personnel, assuming that they have been suitably indoctrinated and do not develop incapacitating symptoms on a psychological basis. The tendency for radiation sickness to appear would be significantly enhanced if the individuals being exposed had been subjected to previous stresses such as prolonged physical effort, loss of sleep and other types of fatigue. Likewise one might expect some degree of enhancement of the radiation effect if the exposed individuals were subjected to the types of stresses indicated above. The biological equivalents of 150 "r" I expect would be pretty much of an incapacitating dose, but it would seem unlikely that there would be an appreciable number of fatalities, providing the individual did not have some concomitant serious injury from some other source. At the level of 350 "r", I would expect this to be the M.L.D.$_{50}$ figure. I should like to introduce an opinion that while my figures might be valid, there will be many operational circumstances in which it will be difficult to predict the exposure that a group of individuals may

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*The shielding of this 1 Mev radiation was of such a nature that the half-value thickness of the emergent x-rays was 9 mm of copper.

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have to undergo to perform a certain manipulation. However, it does seem to me appropriate that both the Atomic Energy Commission and the Armed Forces be given some numbers with a reasonable degree of reliability.

I suspect that one of the reasons that you asked for me to be present was on the question of internal radioactive poisoning which is a field that I have a little more familiarity with than the problem of external irradiation. To summarize briefly, there are three principal routes by which radioactive substances, irrespective of their nature, may gain entry into the body. They are in decreasing significance; inhalation, oral ingestion and entry through abrasions, cuts, etc.

Of these three, inhalation is by far the most important. To indicate the number of millicuries inhaled that might be a crippling or lethal dose, of course, depends upon the radioactive agent, its physical and chemical form, its half-life, nuclear characteristics, etc. There is much that we do not know about this problem, but as a representative figure I would expect that of the order of 10 millicuries of a radioelement such as strontium^{89}, if inhaled as a soluble aerosol and absorbed, would probably be close to the lethal range. This is based on the experience of Dr. Friedell who many years ago gave a patient with widespread metastases from carcinoma of the breast 10 millicuries of strontium^{89} by parenteral injection. The patient nearly died and best estimates that one can make would suggest that the bone marrow got of the order of several hundred roentgen. Should the material inhaled be retained in the lung, it works out that the retention of 10 millicuries of a radioelement possessing the nuclear properties of strontium^{89} would probably produce a severe and possibly fatal radiation injury to the pulmonary tissue. To the best of our knowledge, the high degree of selective uptake noted in bone for so many radioelements is not observed in lymphoid tissue, notably spleen, unless the substance is administered in colloidal form. Likewise the gonads do not, to the best of my knowledge, show any unusual behavior towards fission products or materials that might be made radioactive on a large scale, such as tantalum. Ablation of the thyroid requires about 50 millicuries of I^{131} and this is not a likely hazard without much larger activities from other fission products being present.

As you will probably gather from the above comments, I have been speaking of immediate effects in the sense of disabling changes that might take place in the range from a few hours to a couple of months. Long-term effects such as genetic changes, neutron induced cataracts, and carcinogenesis are a little more difficult to assess, and frankly under the present state of affairs, I feel that more concern should be given to the acute rather than the chronic effect. ✓

It seems to me that it is very desirable to determine in man the range of total body radiation required to induce an appreciable decrease

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in his capacity to execute intricate tasks for which physical well being is essential. If this be done, it should in my estimation be not only total body radiation, but from gamma rays in the 1 to 2 Mev energy level. For both politic and scientific reasons, I think it would be advantageous to secure what data can be obtained by using large monkeys such as chimpanzees which are somewhat more responsive than the lower mammals. Scientifically, the use of such animals bears the disadvantage of the fact that they are considerably smaller than most adult humans and a critical evaluation of their subjective symptoms is infinitely more difficult. If this is to be done in humans, I feel that those concerned in the Atomic Energy Commission would be subject to considerable criticism, as admittedly this would have a little of the Buchenwald touch. The volunteers should be on a freer basis than inmates of a prison. At this point, I haven't any very constructive ideas as to where one would turn for such volunteers should this plan be put into execution. There is much to recommend the use of adult males past the age of 50 in good physical status. However, one can't be certain that these people would respond in a similar manner to the 20 to 40 age group. In concluding, the picture as I see it is to ascertain what is the disabling range and factors which might influence it.

I trust that these comments may have been of some assistance to you, and again, I want to express my regret at not being able to be on hand for the meeting.

With very best regards.

Sincerely yours,

Joseph G. Hamilton, M.D.

JGH:bs

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2 of 2/A - J. G. Hamilton - files

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James T. Davis APR 22 19
SAN Classification Officer

Dr. Charles L. Dunham
Chief, Medical Branch
Division of Biology and Medicine
United States Atomic Energy Commission
Washington 25, D.C.

Dear Chuck:

Please find enclosed the available data from the University of California Hospital which was compiled by members of Dr. Stone's staff who incidentally are quite unaware of the classified nature of this material to the best of my knowledge. I discussed this matter with Dr. Stone and told him that it should not be discussed with anyone in the Division of Radiology with the exception of the two of us.

You will note that there has been a review of the overall situation together with rather fairly detailed accounts obtained from eight patients. The picture is not too clear since a number of patients received stable strontium and several others received some amounts of radio-strontium. In addition, in some instances P^{32} was given which certainly confuses the issue. However, Brumm, Erickson and Reid received quite substantial amounts of strontium^{89}. Consideration must be given that this radioisotope was cyclotron produced, has a half-life of 53 days and decays by emitting beta-particles with a maximum energy of 1.5 Mev. Another point that should not be ignored is the fact that at the time these studies were done there was considerable ambiguity as to the size and value of the microcurie. Extrapolating from my own experience to the present I estimate that these patients got from 20 to 50 per cent more radiation than appear on the charts.

I have discussed the situation with Dr. John Lawrence but to date I have not received any information that would be of value to you concerning those patients treated at Donner Laboratory. I gather that a number of these received both P^{32} and Sr^{89} which would confuse the picture. As soon as I get any additional data referring to strontium in humans I will let you know as soon as possible.

Our own experimental program is progressing very nicely using both rats and monkeys. The technical details are being well worked out and we should have some data for you within the next month or six weeks. If you should find someone who would be in your opinion both competent and the type of person who would fit in with our small organization, another pair of hands would be most welcome.

Sincerely yours,

Joseph G. Hamilton, M.D.

25

Cy. 1/A, 2/A, 3/A - Dr. Dunham
Cy. 4/A - (File JGH)

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SCIENCE TRENDS

HIGHLIGHTS
- ☐ PLUTONIUM EXPERIMENT
- ☐ OZONE METERS
- ☐ ORNL FELLOWSHIPS
- ☐ AVIATION REVIEW
- ☐ FLIGHT SIMULATION
- ☐ HIGHWAY R&D
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Volume XXXV, Number 22
February 23, 1976

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PLUTONIUM EXPERIMENT

A bizarre medical experiment secretly begun by the government in the closing months of World War II is now being disclosed by researchers who find it "reprehensible" from the standpoint of ethics, but valuable from the lessons learned.

The experiment involved the injection of relatively massive quantities of bomb-grade plutonium into the veins of 18 men, women and children who were thought, at the time, to have short life expectancy.

Most, or perhaps all of the subjects, were apparently unaware that they were receiving a substance which has since been described as one of the most toxic known to man. And though all were considered terminally ill at the time, three are still alive today, some thirty years later.

The experiments were carried out in Rochester, San Francisco and Chicago, under the auspices of the Manhattan Project, for development of the atomic bomb. The initial injections were performed before the first detonation of a nuclear warhead, under conditions so secret that the plutonium was referred to only as "the product."

ERDA officials declined this week to provide the names of the individuals involved, either as subjects or experimenters. Written records were said to be "scarce" and "fuzzy." And officials said it is not even clear who ordered the experiments performed.

Although the tests have been known to many senior researchers in the radiobiology field, and have been referred to at some scientific meetings, there have ~~apparently~~ been no detailed published accounts until recent weeks.

In the intervening years, according to knowledgeable researchers, the subjects were never told of the experiments, and their implications, and received no special surveillance, treatment or care.

Medical experiments with human subjects, carried out by the Nazis during World War II, were condemned by an international tribunal at the Nuremberg doctors' trial. The proceedings led to proposed ethical procedures under which subjects would be advised of potential risks, and asked to provide "informed" voluntary consent.

More recently, disclosures of hazardous medical tests performed upon children, prisoners, the mentally infirm, and others by drug companies and government agencies led to Congressional hearings and establishment of a National Commission for the Protection of Human Subjects, operated at the National Institutes of Health, Bethesda, MD. Persons connected with the legislative initatives, and the Commission, said this week they were unaware of the plutonium experiments.

(Continued)

[illegible] WASHINGTON, D. C. 20004

• PLUTONIUM EXPERIMENT (Continued)

The National Commission, an advisory group, recommended last May that a ban on the use of the fetus for medical research be lifted, and may make recommendations next month on the use of prisoners as medical subjects. Sen. Kennedy (D-MA) and others concerned with the human experiment issue, have introduced legislation to make the Commission a permanent group, with White House-level status.

Researchers familiar with the 1945-1947 plutonium experiments, who had no connection with the tests, described them this week as "reprehensible" in the light of "today's" ethics. "We cannot conceive of this ever taking place again," one of them commented.

According to studies completed last year, it was found that 18 persons of "short life expectancy" were injected with quantities of plutonium equivalent to one hundred to eight hundred years of occupational radiation exposure. Through elaborate scientific "detective" work by P.W. Durbin of Lawrence Berkeley Laboratory, Berkeley, CA and her colleague R.E. Rowland of Argonne (IL) National Laboratory, seventeen of these individuals were identified. Eight were found to have survived for at least eight years following the injections, and two men and one woman are still alive today.

The subjects, at the time of injection, ranged in age from four years to sixty nine years. At the time of the experiments, little was known of the relationship of specific doses of plutonium and bone or liver cancer, in man, and not much more is known today. Durbin and Rowland, who had no connection with the original experiments, attempted to find any records which might provide such information. It was in the course of this study that they found, to their surprise, that some of the subjects were still alive.

For the remaining subjects, death certificates were examined, with some unexpected results. "From the listed causes of death," they report, "it appears that plutonium cannot be considered to be a contributing cause for any of these cases." The researchers continued: "These individuals were all gravely ill at the time of the plutonium injections; some died in the hospital shortly after the injections, others survived only to succumb eventually to their diagnosed illnesses."

They reported to the Energy Research and Development Administration (ERDA) that "no bone-or-liver-related malignancies appear in the listed causes of death or the contributing causes on the death certificates, except for those cases in which it was the diagnosed disease at the time of the injection. Further, to our knowledge today...the cases still living show no plutonium-related effects."

However, it may still be "too early" to tell whether the plutonium had any effect. Some radium-induced tumors, in other studies, have appeared as late as fifty years after first exposures. And the comparatively small number of cases involved makes it impossible to conclude that the plutonium radiation doses were not tumor-producing.

The toxicity of plutonium is a controversial matter as government efforts in the energy field shift toward the breeder reactor and the "plutonium economy." The study of the eighteen World War II subjects may shed some light on this subject. The researchers conclude that "these cases serve to demonstrate the plutonium does not appear to be more carcinogenic than expected, and, as far as bone is concerned, may actually be less carcinogenic than expected."

Why were the original experiments carried out? Researchers today note that in the closing months of World War II, and under the extreme secrecy requirement of the Manhattan project, it was believed necessary to determine the potential risks to the many persons involved in weapons research, production and exposure. The urine excretion rates of the subjects were measured and plotted as a function of body burden, providing a method of assessing exposure hazards which is still in use today.

(Continued)

PLUTONIUM EXPERIMENT (Continued)

Whether injecting the key ingredient of the atomic bomb into unsuspecting patients can be equated with Nazi wartime experiments is a matter, which is today, considered moot. When the incident was brought to the attention of officials at ERDA last year, the matter was investigated, and it was decided to inform those surviving of the true nature of their "test" performed three decades ago. The survivors are now under medical surveillance, but no special treatment is being administered."There would be no point of doing anything else now," an ERDA official said.

ENVIRONMENTAL RESEARCH PARK

A 300 square mile site in the Savannah River (SC) Plant, a 200,000 acre area designated as the nation's first National Environmental Research Park (NERP), is now available to qualified scientists and students interested in conducting environmental research. Limited travel funds are also available to assist "selected scientists" in using the NERP.

► *(For details, contact Savannah River Operations Office, Energy Research and Development Administration, P.O. Box A, Aiken, SC 29801.)*

OZONE METERS

Government-sponsored researchers were able to find only one commercially-available meter meeting requirements for field analysis of ozone, which is on the priority list of "worker exposure" toxic substances.

The study, conducted by the Research Triangle Institute (NC) identified a device manufactured by Analytical Instrument Development, Inc., Avondale, PA, as an "excellent" meter for compliance inspection.

► *(Single copies of Evaluation of Portable, Direct-Reading Ozone Meters, NIOSH 76-132, available without charge from Office of Technical Publications/NIOSH, Rm. 530 Post Office Bldg., Cincinnati, OH 45202.)*

ENERGY ANALYSIS PROGRAM

The American Gas Association is introducing an "advanced version" of its energy analysis computer program, E CUBE III (Energy Conservation Utilizing Better Engineering). The program is designed to simulate the thermal response of a building and provide an economic analysis.

► *(For further information, contact K. Cuccinelli, Manager of Systems Analysis, AGA, 1515 Wilson Blvd., Arlington, VA 22209. Telephone: 703/524-2000.)*

ORNL FELLOWSHIPS

A postdoctoral fellowship program has been established at Oak Ridge (TN) National Laboratory offering five two-year appointments each year in areas related to national energy problems and needs.

The Wigner Fellowship Program, named for E.P. Wigner, Nobel laureate and first Director of Research and Development for Clinton Laboratories, ORNL's predecessor, will be open to physical, social and life scientists and engineers no more than three years past the doctoral degree. Benefits include fully competitive salaries and travel and relocation expenses.

► *(Those interested in applying may contact the Office of Professional and University Relations, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830.)*

2/23/76

LIST OF SHIPS PRESENT AT BIKINI FOR
SUFFICIENT PERIOD FOLLOWING TEST
BAKER AS TO BE RADIOLOGICALLY SUSPECT

footnote 18

MOUNT McKINLEY AGC-7
AVERY ISLAND AG-76
HAVEN APH-112
WHARTON AP-7
KENNETH WHITING AV-14
FALL RIVER CA-131
ARTEMIS AKA-21
APPLING APA-58
GYPSY ARSD-1
MENDER ARSD-2
PALMYRA ARST-3
PRESERVER ARS-8
DELIVER ARS-23
CLAMP ARS-33
CURRENT ARS-22
CONSERVER ARS-39
RECLAIMER ARS-42
WIDGEON ASR-1
COUCAL ASR-8
ETLAH AN-79
SUNCOCK AN-80
OHIOTA AN-85
SHACKAMAXON AN-88
ATA-180
ATA-185
ATA-192
ACHOMAWI ATF-148
CHICKASAW ATF-83
ATR-40
ATR-87
LCT-1184
LCT-1420
ROLETTE AKA-99
LST-817
LST-881
GEO CLYMER APA-27
HENRICO APA-45
BOTTINEAU APA-235
BEXAR APA-237
ROCKWALL APA-230

ROCKINGHAM APA-229
ROCKBRIDGE APA-228
ORCA AVP-49
BARTON DD-722
SUMNER DD-692
FLUSSER DD-368
LAFFEY DD-724
MOALE DD-693
HUNTINGTON DD-781
LOWRY DD-770
INGRAHAM DD-694
DIXIE AD-14
COASTERS HARBOR AG-74
HESPERIA AKS-13
POLLUX AKS-4
[illegible] AG-69
TOMBIGBEE AOG([illegible])-11
AJAX AR-6
PHAON ARB-3
TELAMON ARB-8
CEBU ARG-6
ARD-29
CREON ARL-11
SPHINX ARL-24
FULTON AS-11
ATA-187
ATA-124
CHOWANOC ATF-100
MUNSEE ATF-107
WENATCHEE ATF-118
WILDCAT AW-2
LST-388
LST-861
YF-990
YF-733
YO-132
YO-199
YOG-63
YOG-70
YW-92
QUARTZ IX-150

PRESQUE ISLE (APB-44
GUNSTON HALL LSD-5
SAN MARCOS LSD-25
LCI-977
LCI-1062
PGM-24
PGM-23
PGM-25
PGM-29
PGM-31
PGM-32
LCT-1361
LCT-1461
LCT-1359
BENEVOLENCE AH-13
BOWDITCH AGS-4
JOHN BLISH AGS-10
JAMES M. GILLIS AGS-13
YP-636
YMS-354
YMS-358
YMS-413
DUTTON AGS-8
BRAMBLE WAGL
SYLVANIA AKS-44
YMS-463
SIOUX ATF-75
APL-27
SAIDOR CVE-117
N.K. PERRY DD-883
BURLESON APA-67
ST CROIX APA-231
LCI-1091
WALKE DD-723
OTTAWA AKA-101
BEGOR APD-127
CHIKASKIA AO-54
BAYFIELD APA-83
CUMBERLAND SOUND AV-17
NIAGARA APA-87
LCI-1067
O'BRIEN DD-725

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ENCLOSURE (A)

(TOTAL = 120 ships)
DL

Veterans Lose Right to Sue

Law Bars Action Against Contractors for Fallout Exposure

The Washington Post, Sunday, Nov. 11, 1984, p. A3

By Pete Earley
Washington Post Staff Writer

A little-noticed provision inserted in defense legislation in September has stripped several hundred veterans of the right to sue defense contractors for cancer allegedly caused by radioactive fallout from atomic bomb tests.

Sen. John W. Warner (R-Va.), who offered the amendment at the request of the Reagan administration, said that veterans will not be harmed by the five-paragraph provision in the Defense Department authorization bill.

"I would not have done this if I hadn't been assured by the departments of Justice and Energy that veterans who can show a link between cancer and atomic tests are being compensated through the administrative process," Warner said.

Gordon Erspamer, an attorney with the National Association of Radiation Survivors (NARS), charged that Warner was duped by DOE and defense contractors.

"This is a real outrage," Erspamer said. "This bill gives defense contractors license to kill."

The new law, signed Oct. 19 by President Reagan, makes the government, rather than defense contractors, the sole defendant in all pending and future atomic-test lawsuits.

Because veterans are prohibited under a 1950 U.S. Supreme Court ruling—the Feres Doctrine—from suing the government for injuries related to military service, the new law leaves veterans with no one to sue, according to this week's National Law Journal, the first publication to raise questions about the provision.

An estimated 1 million Americans were exposed to radiation fallout during the 693 announced nuclear tests conducted by the government between 1945 and 1980 in the Pacific Ocean and Nevada.

The government has denied liability and argued that neither veterans nor civilians who lived "downwind" from the tests were not exposed to high enough doses of radiation to contract cancer.

But a federal judge in Salt Lake City ruled in May that the government is liable for fallout from poorly supervised atomic bomb tests in the 1950s, blamed for at least nine cancer deaths in rural communities in Utah and Arizona. He awarded $2.66 million to 10 plaintiffs in the suit, which is under appeal.

That judgment sparked a rash of damage suits. The Law Journal estimated that at least 100 veterans have filed suits against more than a dozen contractors, including Monsanto Co., the Sandia National Laboratory in Albuquerque, the University of California and the American Telephone & Telegraph Co. Thousands of civilians are seeking billions of dollars in damages in similar suits in California, Nevada and Colorado.

A Justice Department spokesman said the administration "did not object" when contractors originally asked the Energy Department to propose the new law in 1983.

"The contractors were simply arms of the government making a product for it without profit," the official said. "It would be unfair to abandon them simply because they were hit by a flood of litigation."

The government also would save money under the new law because it promised contractors reimbursement for liabilities incurred because of the tests.

Veterans, who sued contractors to get around the Feres Doctrine, claimed the contractors should be liable because they gave the government bad advice that led to inadequate safety measures, a charge contractors deny.

Warner said DOE officials told him that the University of California intended to drop out of several important tests because officials there were afraid that potential lawsuits would embarrass the school. He said he agreed to insert the provision as chairman of a Senate armed services subcommittee after being told by Bryan Siebert, a DOE official, that the government already had an adequate process to compensate veterans.

Siebert said he was referring to a law passed this year that requires the Veterans Administration to study the six most common illnesses associated with radioactive fallout and decide if veterans should be paid disability compensation.

Records show that more than 3,000 veterans have filed disability claims related to atomic tests. The VA has denied all but 17 on the grounds that it is impossible to prove that veterans' cancers were caused by radiation and not other factors.

THE WASHINGTON POST

A6 WEDNESDAY, NOVEMBER 14, 19

Warner to Review Ban on Vets' Suits Over Atomic Tests

Sen. John W. Warner (R-Va.) said yesterday that he will hold hearings when Congress reconvenes to investigate whether a provision that he inserted into a defense bill in September has hurt veterans who were exposed to atomic radiation.

The law strips the veterans of their right to sue defense contractors who participated in the 693 atomic tests that the government is known to have conducted between 1945 and 1980. It also makes it difficult for civilians who were exposed to fallout in the tests to sue. It is believed that during the tests, more than 1 million Americans were exposed to radiation, high doses of which can cause cancer.

Warner said he proposed the amendment after Energy Department officials told him that the Veterans Administration was compensating veterans for radiation-related health problems.

But the National Association of Radiation Survivors (NARS) and others have contended that the VA is not compensating these so-called "atomic veterans." Records show that of the 4,407 disability claims fielded by these veterans, all but 14 have been denied by the VA on the grounds that it is impossible to prove that veterans' cancers were caused by radiation.

"If it is not clear that veterans are adequately protected by the administrative remedies or procedures allegedly offered, I will consider either amending or repealing that provision of legislation adopted during the last session of Congress," Warner said yesterday.

A4 FRIDAY, AUGUST 30, 1985 THE WASHINGTON POST

Radiation Claims Rejected

■ SAN FRANCISCO—Veterans exposed to radiation in three decades of atomic tests have no grounds for filing damage suits against the government or its independent contractors, a federal judge ruled.

The dismissal of all but one of 43 consolidated radiation injury cases by U.S. District Court Judge William Schwarzer is a major blow to the more than 100 cases involving veterans around the country, the veterans' attorney Ethan Schulman said.

"It is a disappointing decision because it says essentially that thousands of U.S. soliders exposed to radiation as a result of atomic testing in the 1940s, '50s and '60s have no avenue to redress their grievances," Schulman said.

An appeal will be considered, Schulman said.

The judge rejected the arguments of the veterans and their widows that the defense appropriations act of 1985 violated the Constitution by removing liability for injuries from the government and its independent contractors.

Veterans' Suits Barred Over Radiation Injury

SAN FRANCISCO, Aug. 30 (UPI) — A Federal district judge has ruled that veterans who were exposed to radiation in three decades of atomic tests have no grounds for filing damage suits against the Federal Government or its independent contractors.

Judge William Schwarzer dismissed all but one of 43 consolidated radiation injury cases Thursday. Ethan Schulman, the veterans' attorney, said this created a major setback for more than 100 cases involving veterans around the country.

An appeal to the United States Court of Appeals for the Ninth Circuit and to the United States Supreme Court will be seriously considered, he said.

Judge Schwarzer rejected the arguments of the veterans and the widows of some that the newly passed military appropriation bill violated the Constitution by removing the Government and its independent contractors from liability for injuries. Mr. Schulman said the bill, whose sponsor was Senator John W. Warner, Republican of Virginia, "cut off the veterans' means of redress."

The case involved claims by survivors and widows of veterans and civilian Government workers exposed to radiation as an indirect result of the bombing of Hiroshima as well as tests of nuclear bombs in Nevada, the Marshall Islands and Christmas Island from 1946 to 1962. Many of the veterans and civilian employees suffered various forms of cancer and leukemia they said were linked to their exposure to radiation.

NY Times
Saturday Aug 31, 1985
p. 9

THE NATIONAL
LAW JOURNAL

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Mergers & Acquisitions Pages 15-20

New Law May Curb Atom-Test Suits

Congress Drops Bombs on Vets

By Francis J. Flaherty
National Law Journal Staff Reporter

"It's as if Congress decided the courts were too crowded and said, 'OK, let's throw out every case whose docket number ends in 4.'"

— A veterans' lawyer

A LITTLE-noticed provision in an 11th-hour defense bill signed into law last month by President Reagan could sharply curb lawsuits by thousands of veterans, their families and civilians over cancers allegedly caused by radiation from the government's atomic-weapons testing program.

The new law — a five-paragraph provision in the $300 billion military spending bill hurriedly passed by Congress before the election recess — makes the federal government the sole defendant in all pending and future atomic-test cases, in place of dozens of companies and research institutions sued because they participated in the testing program. The law also directs that all such suits be tried under the Federal Tort Claims Act (FTCA).

The law works drastic changes on scores of pending lawsuits and many others yet to be filed, say surprised and dismayed plaintiffs' attorneys. The law apparently makes it impossible for veterans and their families to sue because of limits on government liability mandated by a 1950 Supreme Court case. And because of the strict provisions of the FTCA, the measure also narrows greatly the kinds of suits that civilians can bring.

"If this law is valid, the veterans and their families might as well pack their bags," said one veterans' lawyer, James Geagan of San Francisco's Hoberg, Finger, Brown, Cox & Molligan, P.C. "It's dark times for the vets."

Continued on page 24

11th-Hour Law Slips Past Vets

Continued from page 1

Plaintiffs' lawyers — many of whom were unaware that the provision was in the defense bill until after the president signed it Oct. 19 — quickly criticized both the substance of the law and the way it was enacted. They charged not only that the statute is rife with constitutional defects and fundamentally unfair, but also that it was passed furtively.

"It's sneaky, it's underhanded, there are a lot of adjectives" to describe how the bill became law, said Gordon P. Erspamer of San Francisco's Morrison & Foerster, a plaintiffs' lawyer in one of the many pending "atomic veterans" suits.

Overshadowed Measure

The administration-backed law is sandwiched in the Department of Defense Authorization Act of 1985. The atomic-test measure was overshadowed by such controversial defense matters as the MX missile and the Rapid Deployment Force, which were also the subject of provisions in the military appropriations bill. Pub. L. No. 98-525, Sec. 1631.

The atomic-test measure was included in the Senate version of the bill, but not in the bill passed by the House, where a similar provision died in committee last year. A House-Senate conference committee approved the bill with the measure intact on Sept. 25. Two days later, the bill was approved by voice vote in both houses.

Administration officials and lawyers for private contractors say the law is deserved protection for the contractors, forced to defend against atomic-test suits despite their role as mere government instrumentalities in the testing program.

And although the contractors are shielded from the costs of the suits by what one lawyer called "open-ended and ironclad" indemnity agreements with the government, the new law saves them from the inconvenience and bad publicity of the suits, their lawyers say.

Administration officials and lawyers for private contractors defended the law as needed protection for the contractors.

Some observers also add that lack of vigilance by veterans' groups — who mounted vigorous opposition to the measure when it was considered by Congress last year — may be the reason the bill became law.

But whatever the merits of the bill or of the manner of its passage, most attorneys agree that the law — if upheld — will markedly alter one of the most explosive and potentially expensive areas of mass torts. And because of the 34-year-old Supreme Court case, veterans and their families probably will be the hardest hit.

'Exclusive' Defendant

The new law makes the federal government the "exclusive" defendant in all pending and future civil suits over "exposure to radiation based on acts or omissions by a contractor in carrying out an atomic weapons testing program under a contract with the United States." According to Mr. Geagan, the law "puts the contractors in the shoes of the government."

AP Wide World Photos

RULES CHANGED: A little-noticed provision in a defense bill could drastically change the rules under which lawsuits by veterans who participated in atomic tests — such as this one in 1951 — can proceed.

And the government's shoes are a very comfortable place to be because of the Supreme Court decision in *Feres v. U.S.*, 340 U.S. 135, plaintiffs' lawyers say. In that 1950 case, the high court barred veterans' suits against the government that "arise out of or are in the course of activity incident to military service." The court reasoned that the rule, now known as the Feres doctrine, promotes military discipline.

By naming the government as the defendant in atomic-test suits, the new law extends the reach of *Feres* to all pending and future veterans' suits. "By saying a suit against a contractor is a suit against the government, the new law brings the Feres doctrine into play," said Allan J. Favish of the Los Angeles firm of Chasalow, Fenigstein & Kaufman.

Mr. Favish was one of the first lawyers to advise atomic veterans to sue private contractors in order to avoid the Feres doctrine. He made that suggestion in a 1981 Hastings law review article, and since then many veterans have followed the strategy.

But the new law makes the tactic useless, Mr. Favish suggested. The pending veterans' suits against the contractors "will probably be thrown out of court," he surmised, and the government — the new defendant — will be armed with the Feres doctrine.

While plaintiffs' attorneys plan a vigorous court fight against use of the Feres doctrine under the new law, some note that such arguments have fared poorly in the past.

A Dead End?

The doctrine has been applied not only to veterans who sue the government for injuries allegedly suffered in service, but also to veterans' families who bring wrongful-death suits or who claim to have inherited an illness related to veterans' service. And there are very few — and very narrow — exceptions to *Feres*, said Mr. Geagan.

Plaintiffs' lawyers say the new law

Continued on page 26

Vets' Lawyers Blast 'Sneaky' New Suit Limits

Continued from page 8

will greatly hamper civilians who bring atomic-test suits, too. Before the law was enacted, civilians could sue in state or federal court and could name as defendants either the government, private contractors or both.

Civilians also could opt for a jury or a judge trial, seek punitive damages from private contractors, forward theories of strict liability based on the hazardous nature of atomic weapons and make all the other strategic choices parties in litigation make.

But the new law deprives civilians of such options, plaintiffs' lawyers say. The statute requires that civilian plaintiffs sue only the federal government under strict FTCA rules.

The FTCA requires that claimants sue only in federal court, and it forbids both jury trials and recovery for punitive damages. Also, courts have construed the act to prohibit use of theories of strict liability, thus forcing plaintiffs to prove the government's "negligence or wrongful conduct" in order to recover.

The many present and potential atomic-test suits mean the new law — if upheld — will have widespread impact, plaintiffs' lawyers say. The pending cases include an estimated 100 veterans' suits filed in several states against such atomic-test contractors as the Sandia National Laboratory in Albuquerque, N.M., the University of California, American Telephone & Telegraph Co. and Monsanto Co.

By naming the U.S. as the sole defendant in atomic-test suits, the new law may extend the reach of the Feres doctrine.

And there are pending civilian suits against both private contractors and the government in California, Colorado, Nevada and other states. Some of these involve hundreds of plaintiffs.

'Billions in Damages'

In the words of a Senate Armed Services Committee report on the new law issued last May, "Literally thousands of plaintiffs have filed suits against the operators of the government laboratories that have participated in the government's nuclear weapons tests . . . Plaintiffs are seeking tens of billions of dollars in damages."

Daunting as this description is, the pending suits are dwarfed by the possible ones. From 1945 to 1980, the federal government conducted 693 announced nuclear tests.

"We estimate that there were a million people exposed to radiation during the atomic-testing program," said Dorothy Legarreta, administrative director of the National Association of Radiation Survivors, a non-profit atomic-test victims' group in Berkeley, Calif. That sum includes 250,000 veterans, 250,000 laboratory workers, 250,000 workers at test sites, 120,000 "downwind people" — as the civilians near test sites are called — as well as uranium miners and others.

In general, attorneys for the contractors agree with plaintiffs' lawyers that the new law, if upheld, will endanger suits by veterans and their families and reduce the litigation options of civilians. "That's the way I read it," said Sandia's lawyer, Jerome C. Dougherty of San Francisco's Pillsbury, Madison & Sutro.

He cautioned that the ultimate effect of the law depends on regulations the Justice Department sets up under the statute. But while the department would make no official comment on the new law, an Oct. 12 department letter in a San Francisco atomic-veterans case suggests that federal lawyers read the law much as the plaintiffs' and contractors' lawyers do.

Schedule Requested

The letter was sent to U.S. District Judge William W. Schwarzer, who is presiding over about 40 consolidated veterans' suits against private contractors. The two Justice Department attorneys who signed the letter requested a revised case schedule because of the law.

"We anticipate that each contractor-defendant will avail itself of this statute," the lawyers wrote. "Pursuant to the statute, the United States would thereafter be the sole defendant." *In re Consolidated United States Atmospheric Testing Litigation*, C-84-0022.

Another Justice Department official left little doubt that after the switch of defendants is made, the department will seek dismissal under the Feres doctrine. "Where *Feres* is appropriate, we will apply it," said B. Wayne Vance, deputy assistant attorney general of the Civil Division.

Mr. Vance, along with Department of Energy general counsel Theodore J. Garrish, testified for the administration in favor of the unsuccessful bill before Congress last year.

Plenary Control

Mr. Garrish, who sent a letter to the Senate last March in support of this year's law, referred calls about the rationale of the statute to Mr. Vance. The basic reason for the law, Mr. Vance said, is that the government — not the contractors — had plenary control of the atomic-test program. "The litigation should lie against the proper party," he said.

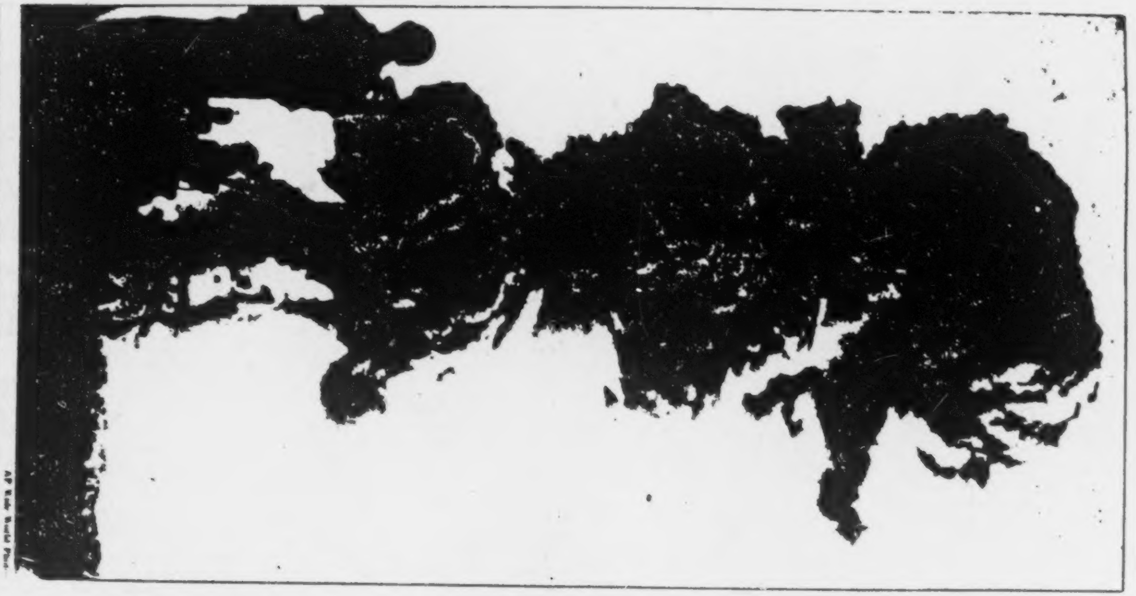
In the words of the May Senate report, "The committee does not believe that any contractor should be used as an instrumentality of the government and then abandoned when inundated by a flood of litigation arising from that same government activity."

Constitutional Challenge

Plaintiffs' lawyers sharply disagreed with this reasoning. The law is "unfair," charged veterans' lawyer Thomas J. Brandi of San Francisco's Bianco, Brandi & Jones. "If the government passes special legislation to protect its contractors, it should have done something to protect the over 200,000 potential [veteran] plaintiffs and their families."

Veterans' attorneys are especially galled by the law because their clients have few ways to seek compensation for their claimed atomic-test illnesses. Not only does the Feres doctrine forbid veterans to sue the government, but also the Veterans Administration has denied the "lion's share" of atomic veterans' claims, said Mr. Erspamer. He explained that the VA concluded the

One Justice Department official left little doubt that the agency will ask for dismissal under the Feres doctrine.



AP Wide World Photo

veterans had not shown their illnesses were caused by the atomic-test program.

With the final avenue — suits against private contractors — now closed to their clients, veterans' lawyers are expected to raise constitutional objections to the new law. "I think there are several constitutional defects" in the statute, said Mr. Brandi. Most importantly, the retroactive aspects of the law violate both the Fifth Amendment right of due process and its guarantee of compensation for takings, he and others say.

Regarding pending cases, Mr. Brandi argued that "courts have recognized that people with claims pending in court have a property interest in that claim." Other plaintiffs' lawyers say even those who have not yet filed atomic-test suits are constitutionally protected, because their exposure to radiation took place between 1945 and 1980 — long before the law was passed.

Plaintiffs' lawyers also charge that the new law violates the equal protection clause because it singles out atomic-test contractors for favored treatment, and that the measure deprives civilians of their Seventh Amendment right to a jury trial in civil cases.

Such arguments "are issues we have observed as well," said Mr. Dougherty. While he and other contractors' lawyers have little doubt these constitutional claims will soon be raised, they stress that the merits of the arguments can only be determined in court.

Concerning suspicions that the law was purposely inserted as a tiny part of a much larger statute, one legislative aide noted that there were at least two congressional reports which, albeit briefly, discussed the bill.

But whether or not there was a conscious attempt to slip the law into the books unnoticed, the measure has been noticed now and the battle may be just beginning. "We're definitely going to bring this up in the 99th Congress," said H. Lee Halterman, district counsel for Rep. Ronald V. Dellums, D-Calif., who opposed the measure last year.

TESTIMONY OF PROFESSOR WILLIAM A. FLETCHER ON BEHALF OF THE NATIONAL ASSOCIATION OF RADIATION SURVIVORS

BEFORE THE

UNITED STATES SENATE
VETERANS AFFAIRS COMMITTEE
(OVERSIGHT)

99th Congress, 1st Session

November 14, 1985

Mr. Chairman and Members of the Subcommittee:

I am William A. Fletcher, Professor of Law at the University of California, Berkeley (Boalt Hall). I have been asked by the National Association of Radiation Survivors to submit this testimony on the so-called Warner Amendment, and on the constitutional and policy issues raised by suits against government contractors arising out of the atomic weapons testing program. This testimony is divided into three parts: first, a summary of existing law; second, an analysis of constitutional and policy problems posed by existing law and, in particular, the Warner Amendment, and third, a brief summary of the foregoing discussion.

I. EXISTING LAW

Suits for damages against government contractors involved in the atomic weapons testing program are currently governed by the Warner Amendment, Section 1631 of the Department of Energy National Security and Military Nuclear Energy Authorization Act of 1985 (codified at 42 U.S.C. §2212). That amendment provides that in any action for injury, loss of property, personal injury, or death due to exposure to radiation based on acts or omissions by a government contractor in the atomic weapons testing program, the action shall be deemed a tort action brought against the United States under the Federal Tort Claims Act ("FTCA"). 42 U.S.C. §2212(b). While the amendment says nothing on its face about substitution of the United States as a party defendant in such actions, that is its apparent effect. Id. §2212(a)(2). The United States may raise in such an action any defenses that would ordinarily be available to it in a proceeding under the Federal Tort Claims Act. Id. §2212(a)(2). The amendment applies explicitly to actions pending at the time of its enactment. Id. §2212(c).

So far as I am aware, only one judicial decision to date has fully construed the Warner Amendment and applied it to pending actions for damages arising out of the United States' atomic weapons testing program.[1] That decision was recently rendered by a federal district court in San Francisco. In re

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[1] In another recent decision under the Warner Amendment, a federal district court substituted the United States for several government contractors in a group of consolidated pending cases. Prescott v United States, et al, Civil LV 80-143 RDF 6, D. Nev., September 19, 1985. However, the court issued only a short memorandum order of the substitution, and it has not yet entertained any motion for dismissal of summary judgment by the United States.

Consolidated United States Atmospheric Testing Litigation, No. C-84-0022-WWS (N.D. Cal. Aug. 28, 1985). In that case, 31 plaintiffs sued the United States and various government contractors. The district court granted the United States' motion pursuant to the Warner Amendment to substitute itself for the contractor defendants. The court then granted the Government's motion for summary judgment on the grounds that the actions were barred by (1) the "discretionary function" exception to the Federal Tort Claims Act (28 U.S.C. §2680(a), and (2) the Feres doctrine (Feres v. United States, 340 U.S. 135 (1950)), which bars FTCA actions by servicemen for injuries incident to their military service. Both of these defenses rest upon the soverign immunity of the United States. Neither defense is ordinarily available to private parties, such as government contractors, in tort actions.

As a result of the Warner Amendment and its application to this case, the 31 plaintiffs have been deprived of any judicial remedy against private contractors on the basis of soverign immunity defenses ordinarily available only to the Government. The effective consequence of the amendment has been to preclude judicial inquiry into what the private contractors actually did, and to preclude any judicial remedy for injuries or death due to exposure to radiation in the course of the atomic weapons testing program.

II. CONSITUTIONAL AND POLICY PROBLEMS UNDER THE WARNER AMENDMENT

A. Analysis of the Warner Amendment

The Warner Amendment is an unusual law in several respects. First, it effectively provides that private contractors shall have all the soverign immunity defenses of the United States in suits arising out of the atomic weapons testing program. Such immunity has been provided to private parties in the past, but only to individuals employed by the United States. Only two classes of Government employees have ever been given such protection: drivers of motor vehicles and health care providers. 28 U.S.C. §2679(b)-(e) (see Carr v. United States, 422 F.2d 1007 (4th Cir. 1970)) (Federal Drivers Act); 10 U.S.C. §1089 (Armed Forces health care providers); 22 U.S.C. §817 (Foreign Service health care providers); 38 U.S.C. §4116 (Veterans Administration health care providers); 42 U.S.C. §233 (Public Health Service health care providers).

Only once has a government contractor been protected by the United States being substituted as the defendant. This protection was provided to vaccine manufacturers and providers under the Swine Flu Act. 42 U.S.C. §247b (revised an in pertinent part replaced by Public Law 95-626 (1978)) (see Ducharme v. Merrill-National Laboratories, 574 F.2d 1307 (5th Cir.), cert denied, 439 U.S. 1002 (1978)). But it is crucial to note that while the United States stepped in as the defendant under the Swine Flu Act, its liability was determined under essentially the same substantive law as that applicable to the private defendants. 42 U.S.C. §247b (k)(2)(A). That is, the United States was not permitted under the Swine Flue Act to assert the soverign immunity-based defenses available to it under the Federal Tort Claims Act. In this important respct, the operation of the Swine Flu Act is fundamentally unlike the operation of the Warner Amendment.

Second, the Warner Amendment operates retroactively. It is explicitly made applicable not only to events that took place before its passage, but even to cases that were actually pending in court at the time of its passage. 42 U.S.C. §2212(c). By contrast, the Swine Flue statute--the only other law substituting the Government in the place of independent contractors--was explicitly made prospective, applying only to causes of action arising after its passage. Moreover, none of the statutes providing the soverign immunity shield to Government employees appears to operate, or to have operated, retroactively. Several explicitly provide for prospective operation. Other, older statutes are silent on the issue, leading me to conclude that they operated in the normal fashion of statutory enactments --which is to say, prospectively.

Third, the effect of the Warner Amendment is to require that suits against the United States arising out of the atomic testing program shall be to the court rather than to the jury. The consequence may be illustrated by reference to a federal court action brought prior to the amendment. Such an action would be a common law action against a private defendant, and the Seventh Amendment to the Constitution would guarantee a jury trial on all factual issues. But the Warner Amendment would transform this litigation into a suit against the Government under the Federal Tort Claims Act, and all issues of act in Tort Claims cases are to a judge rather than a jury. The Warner Amendment thus has the consequence of depriving the litigants of their Seventh Amendment right to a jury trial because of the substitution of the United States for the contractor defendant.

Finally, the Warner Amendment appears to provide no substantive protection to the contractors' financial interest that was not already provided. As I understand it, all of the contractors affected by the Warner Amendment had indemnification agreements under which the United States had agreed to reimburse them for damage judgments and costs of defense resulting from suits arising out of the atomic testing program. Thus, even without the amendment, the contractors would have been held harmless in the event of a judgment against them.

B. Legislative History

The unusual nature of the Warner Amendment has led me to question whether Congress was aware of what it was doing when the amendment was passed. The strength of my question is reinforced by passages from the legislative history of the amendment. The House Committee on Armed Services in 1983 and the Senate Committee on Armed Services in 1984 both described the amendment as facilitating coordination of suits and uniformity of outcome by permitting "the consolidation of these many cases under the leadership of the Department of Justice, with the United States as a co-defendant" (emphasis added). H. Rep. No. 124, 98th Cong., 1st Sess. 29 (1983); S. Rep. No. 500, 98th Cong., 2d Sess. 374 (1984) (identical wording). If the consequence of the amendment were to permit the United States to enter a suit merely as a co-defendant, I would not be here today. But the amendment has been construed to permit the United States to be substituted as the sole defendant, thereby eliminating the contractors entirely from any suit.

Further, the Conference Committee Report on the bill that was finally passed described the amendment as follows: "This section would provide a remedy against the United States for injury, due to loss of property, personal injury, or death due to exposure to radiation emissions by a contractor carrying out atomic weapons tests under a contract with, and under the direction and control of, the United States" (emphasis added). H. Conf. Rep. No. 1080, 98th Cong., 2d Sess. (1984). With all due respect, I must say that I consider this language misleading. The amendment takes away a remedy previously available against private contractors. And the remedy "provided" against the United States is, in almost all cases, illusory because of the soverign immunity-based defenses available to the United States.

C. Constitutional Problems

I find it difficult to believe that the Warner Amendment was passed by Congress in the exercise of its considered judgment. I feel this way in part because of the legislative history I have just recited. But I feel this way in most important part because of serious and fairly obvious questions about the constitutionality of the amendment. I do not mean here to advance all possible constitutional arguments against the amendment, but I do wish to discuss two constitutional issues of particular concern to me. They are the retroactive application of the statute and the deprivation of a jury trial.

Retroactive Application

Statues have, on occasion, been applied retroactively, but for obvious reasons this is an undesirable and disfavored way for legislation to operate. I am unaware of any statute precisely comparable to the Warner Amendment having been given retroactive operation. An examination of the manner in which the Warner Amendment operates will reveal the constitutional difficulties that are inescapably presented.

We should begin by understanding at the outset why retroactive legislation is disfavored. One reason is the rationale behind the constitutional prohibition against ex post facto laws. The objection lies, in Dean Ely's words, in "attaching untoward [and, I would add, unforeseen] consequences to an act performed before [the statute] was enacted." J. Ely, Democracy and Distrust 91 (1980).

But the vice of retroactive application goes beyond the violation of expectation inherent in the lack of warning of consequences that will be attached to one's conduct. It goes, in addition, to the danger that legislation can be used to the advantage or disadvantage of particular, identifiable groups. Prospective legislation operates fairly for all people in the sense that people potentially subject to the legislative command are identifiable, if at all, only by predicting the behavior of those people. Retroactive legislation, by contrast, permits the legislative body to identify people whose conduct has taken place, and to penalize or reward precisely those people. In other words, retroactive legislation potentially offers to the legislature a tool by which, under the guise of facially neutral commands, to penalize or reward easily identifiable people or groups whose conduct is complete.

Finally, when the retroactive legislation applies not only to past conduct but also to pending lawsuits, yet another objection is necessarily raised. Our government is built upon the principle of separation of powers. Subject only to the veto power of the President, Congress is responsible for the enactment of our statutes. And the federal courts are responsible for the application of these laws in cases properly brought before them. When a case is pending before a court under a particular law, Congress--sensing a result it may not like--should not be able at this late stage to change the law. If it attempts to do so, Congress is stepping outside its proper sphere.

The Warner Amendment is undesirable and potentially unconstitutional retroactive legislation in all of the respects outlined above. There are several doctrinal arguments under which one might attack the retroactive application of the amendment, two of which I regard as particularly important.

One argument is that the deprivation of an accrued cause of action constitutes a "taking" for which compensation must be paid. The Supreme Court has repeatedly indicated that accrued causes of action constitute property for purposes of the taking clause. For example, in Armstrong v. United States, 364 U.S. 40, 46-49 (1960), the Court held that the action of the United States had the consequence of destroying the value of plaintiff's materialmen's liens under State law, and that this action constituted a taking for which compensation was due. As recently as 1981, the Supreme Court sustained the power of the President to suspend private causes of action against the Government of Iran. But even here, where the Executive power over foreign relations was at stake, the Court pointedly noted that the question of "taking" those causes of action was not before it: "Though we conclude that the President has settled petitioner's claims against Iran, we do not suggest that the settlement has terminated petitioner's possible taking claim against the

United States." Dames & Moore v. Regan, 453 U.S. 654, 689 n.14 (1981). See also Richmond Screw Anchor Co. v. United States, 275 U.S. 331 (1928); Logan v. Zimmerman Brush Co., 455 U.S. 422 (1982). In the situation now before us, significant numbers of people injured or killed by radiation had accrued causes of action against private contractors. The consequence of the Warner Amendment has been to make these causes of action worthless. Under the precedents of the Supreme Court, I think the Warner Amendment very possibly constitutes an unconstitutional taking.

In the particular circumstances presented by the Warner Amendment, there is another argument stemming from the fact that the amendment applies not only merely to accrued causes of action, but also to pending suits. Legislation purporting to change the rule of decision while a case is sub judice has always been very troublesome. The fountainhead case is United States v. Klein, 80 U.S. (13 Wall.) 128 (1871), in which Congress sought to prevent Southerners who had participated in the Civil War from relying on a Presidential pardon to show their right to a restoration of their property. In a difficult and ambiguous opinion, the Court struck down the statute by which Congress sought to achieve its end, saying, among other things, that Congress had tried "to prescribe a rule for the decision of a cause in a particular way." 80 U.S. (13 Wall.) at 146. The present Supreme Court has characterized Klein as holding the statute unconstitutional because, inter alia, "it prescribed a rule of decision in a case pending before the courts, and did so in a manner that required the courts to decide a controversy in the Government's favor." United States v. Sioux Nation of Indians, 448 U.S. 371, 404 (1980).

In the situation now before us, it is pretty clear that by the Warner Amendment the United States has sought to change the rule of decision in cases pending before the courts, and to do so in a manner that requires a decision in its favor. It is undisputed that the rule has been changed in pending cases: the United States is substituted as a defendant and is then permitted to assert defenses previously unavailable against the plaintiffs. And it is also clear that the change works in the United States' favor. If the private contractors had been forced to rely only on the defenses available to private defendants and had suffered judgments against them, the United States would have been obliged to hold them harmless under their indemnification agreements with the contractors. But the Warner Amendment permits the United States to step into pending suits and to assert previously unavailable defenses, thereby protecting its contractors (and therefore itself) from liability. This result certainly seems odd, and I would say unfortunate, from the standpoint of public policy. The Klein case, particularly as construed in Sioux Nation, may well compel a conclusion that the result is also unconstitutional.

Jury Trial

In addition to my serious doubts about the constitutionality of the retroactive application of the statute, I also have substantial doubts about the deprivation of jury trial that results from the Warner Amendment. The Seventh Amendment to the Constitution provides, "In suits at common law...the right of trial by jury shall be preserved...." U.S. Constitution, Amend. VII. The Supreme Court has consistently read the Amendment expansively to require jury trials even where that mode of trial is awkward or inconvenient. As the Court stated in Jacob v. New York, 315 U.S. 752, 752-3 (1942), "The right of jury trial in civil cases at common law is a basic and fundamental feature of our system of federal jurisprudence which is protected by the Seventh Amendment . . . [and] should be jealously guarded by the courts."

If the suit were simply between the injured plaintiffs and the private contractors, there can be no question that the Seventh Amendment would require a jury trial. The issue posed by the Warner Amendment is whether the device of substituting the United States as a defendant can constitutionally have the consequence of depriving plaintiffs of that right.

There is only one other federal statute that has the same consequence for jury trial as the Warner Amendment.[2]

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[2] The statutes under which the United States steps in as defendant when its own employees are sued present quite different jury trial issues. By analogy to respondeat superior, the employees of the sovereign may be seen as sufficiently closely identified with the sovereign that a suit against the employees may be regarded as a suit against the sovereign for purposes of the jury trial guarantee.

That is the Swine Flu Act, which substitutes the United States as defendant for private manufacturers and distributors of the Swine Flu vaccine. The Court of Appeals for the Fifth Circuit has found that the denial of jury trial is constitutional. Ducharme v. Merrill-National Laboratories, 574 F.2d 1307 (5th Cir.), cert. denied, 439 U.S. 1002 (1978). But the court of appeals wrote no opinion in the case, and merely appended the district court's opinion to its one-sentence per curiam order. The district court concluded in one paragraph that the Seventh Amendment jury trial right is not invoked when the sovereign consents to suit, since the sovereign "may attach any conditions (including no right to trial by jury) to its consent." 574 F.2d at 1311.

I confess that I am unconvinced by the district court's rationale in the Ducharme case. It is unquestionably true that the United States need not consent to trial by jury when it waives its sovereign immunity and consents to suit. But the question here is whether, when the United States seeks to interpose its sovereign immunity defenses in order to protect a private defendant, it may deprive a plaintiff of a jury trial. Such a question has never been presented to the Supreme Court, and I suspect that the Court would take the jury trial question much more seriously than did the Ducharme court. My own opinion is that the deprivation of jury trial by the Warner Amendment stands a very good chance of being held unconstitutional if and when the question is ever presented to the Supreme Court.

I thus regard both the retroactive application of the Warner Amendment and the denial of jury trial effected by the Warner Amendment as vulnerable to serious constitutional challenge. I note that my opinion on both these issues was shared by the Judiciary Committee of the House of Representatives in 1983 when the Committee reported adversely on the bill that eventually became the Warner Amendment. On the retroactivity question, the Committee wrote, "The Committee is concerned that Section 213 would eliminate property interests in pending causes of action in violation of the Fifth Amendment." On the jury trial question, the Committee wrote, "To eliminate the right to trial by jury in cases against these contractors would violate the Seventh Amendment." H. Rep. 124, 98th Cong., 1st Sess. 5 (1983) (Adverse Report).

D. Policy Problems

As a matter of policy, if I may briefly address that issue separately from the constitutional issues, I regard the Warner Amendment as profoundly misguided. Sovereign immunity has long been regarded as, at best, a necessary evil. During this century, Congress has cut back on sovereign immunity as it has come increasingly to regard it as less necessary and correspondingly more evil.

Academic commentators of various political persuasions have been uniformly hostile to the expansive versions of sovereign immunity. Professor Borchard of Yale set the tone for much of our thinking about sovereign immunity in the 1920s. Borchard, Government Liability in Tort, 34 Yale L. J. 1, 129, 229 (1924). And contemporary legal scholars such as Professor Shapiro of Harvard and Professor Currie of Chicago continue to find the doctrine troublesome and largely undesirable. See, e.g., Shapiro, "Comment--Wrong Turns: The Eleventh Amendment and the Pennhurst Case," 98 Harv. L. Rev. 61, 62 (1984) ("[T]he doctrine in its more blatant forms is at war with the principle that government must be accountable to the people through the courts."); Currie, "Sovereign Immunity and Suits against Government Officers," 1984

Sup. Ct. Rev. 149, 168 ("Sovereign immunity is an unattractive doctrine that does not belong in an enlightened constitution.")

In certain circumstances, sovereign immunity continues to be a necessary evil, a doctrine that permits the government to carry out its proper purposes without fear of crippling liability resulting merely from having performed its governmental functions. I confess, however, that I am unable to see what important purpose is served by permitting the United States to assert its sovereign immunity to protect its contractors against suit. If the aim is to protect the contractors from liability, that is already accomplished by the indemnification agreements between the United States and contractors. If the aim is to protect the contractors from embarrassment, I think the contractors should be embarrassed to have to hide behind the government's skirts of sovereign immunity. And I refuse to entertain the thought that the aim of the Warner Amendment is to permit the United States to avoid paying its indemnification claims by an indirect and devious route--by protecting its contractors from judgments on what would otherwise be valid claims against them.

II SUMMARY

In summary, I regard the Warner Amendment as seriously flawed. There are serious grounds to believe that it is unconstitutional. And there are substantial arguments against it from a policy standpoint.

The Warner Amendment singles out for special adverse treatment civilians and veterans who have served their country with selflessness and devotion. It changes the law without notice and in mid-trial so that it now works against these men and women unfairly and in a wholly unforseen way. Repeal of the Warner Amendment is necessary to eliminate the constitutional and policy problems I have discribed above. And repeal is necessary if the United States wishes to say to its civilians and veterans, and to the world, that our country treats its citizens fairly and honestly.

Finally, let me be clear about what I think would be accomplished by the repeal of the Warner Amendment. A repeal would not necessarily make the government's contractors liable to those injured in the atomic weapons testing program. It would merely permit those who have been injured to present the merits of their claims to courts of competent jurisdiction. These victims do not seek special treatment. They seek only the exercise of the ordinary right of private litigants--to present their claims for legal determination of the merits of those claims.

092785/5-374100f

NATIONAL ASSOCIATION OF
RADIATION SURVIVORS

COMPILED WRITTEN TESTIMONY OF THE BOARD OF DIRECTORS OF THE NATIONAL ASSOCIATION OF RADIATION SURVIVORS

BEFORE: UNITED STATES SENATE
COMMITTEE ON VETERANS' AFFAIRS
RUSSELL SENATE OFFICE BUILDING
WASHINGTON, D. C. 20510

BY: FRED C. THOMPSON, CENTRAL-EAST V.P.
NOVEMBER 14, 1985

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1. INTRODUCTION:

On September 26, 1984, at the end of this legislative session, Congress passed the Defense Authorization Act of 1985. Attached as a rider to this bill was Section 1631, entitled "Contractor Liability for injury or Loss of Property Arising Out of Atomic Weapons Testing Programs," which is identical to Section 312 of Senate Bill 1107, defeated in the U. S. House in the 1983 session, sponsored by the University of California. This legislation, under the guise of a procedural change, retroactively immunizes all private contractors from any liability arising out of the atomic bomb testing program, and emasculates the ability of atomic veterans to obtain compensation for the cancers, leukemias and other diseases stemming from their exposure to ionizing radiation during the atomic bomb tests dating back to 1945. The House of Representatives Committee on the Judiciary had previously (on June 15, 1983) submitted an adverse report on H.R. 2797, the milder House version of this legislation (see Exh. "B" hereto), noting that

> "An ex post facto change in the legal status of a contractor in the midst of pending litigation would certainly lead to constitutional challenges based on alleged violations of both Fifth Amendment due process rights and the right to jury trial guaranteed by the Seventh Amendment."

Section 1631 mirrors a proposed House amendment to H.R. 2797 attached to the statement submitted by B. Wayne Vance, Deputy Assistant Attorney General, Civil Division, dated June 7, 1983.

Because this legislation will destroy the only remaining avenue for atomic veterans to obtain redress for their injuries, the National Association of Radiation Survivors ("NARS")[1] urges all responsible citizens to write immediately to their Congressional representatives to protest this latest indignity.

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[1] NARS is a California non-profit corporation with its principal office located in San Francisco, California, devoted to serving atomic veterans, civilians and others who were exposed to radioactive fall-out as a result of the atomic bomb testing program.

II. SUBSTANTIVE ANALYSIS:

Section 1631 purports retroactively to extend the immunity enjoyed by the federal government under the *Feres* doctrine (derived from *Feres* v. *United States*, 340 U.S. 135 (1960)) to all "contractors" who participated in the atomic bomb tests. The term "contractors" is broadly defined to include any contractor or subcontractor of any tier participating in the atomic weapons testing program, including research facilities who have conducted research into the health effects of ionizing radiation. In effect, the legislation grants the private contractors a "license to kill." Thus, the legislation will purportedly immunize not only educational institutions such as the University of California and Lawrence Livermore National Laboratory, but companies such as Western Electric Co., Dow Chemical Co., Monsanto Chemical Co., Union Carbide, Dupont, Rockwell International and Holmes & Narver, and all their employees. It accomplishes this end obliquely by defining actions against such contractors as actions against the United States and making such actions "subject to the limitations and exceptions applicable to those actions." (Section 312(a)). One of those "limitations" is the *Feres* doctrine, which bars suits by veterans for service-related deaths or injuries. The bill could result in the dismissal of approximately 100 pending actions by atomic veterans against private contractors whom the U.S. is currently defending under written contracts of indemnity with the contractors.

It is important to note that this legislation retroactively immunizes all conduct by contractors and not merely actions taken pursuant to government instructions. Thus, it even immunizes acts by contractors directly contrary to government instructions. A number of the pending suits against contractors allege that the contractors gave negligent and incorrect advice to the government regarding protective measures for servicemen, monitoring equipment and other subjects. It will also bar civil suits against private contractors for any deliberate torts, such as murder and mayhem, arising out of the weapons testing program.

III. COMMENT:

Section 1637 retroactively immunizes any tortious conduct of contractors involved in the atomic bomb tests. For veteran participants in such tests, it will likely result in dismissal of their pending actions against private contractors under the Feres doctrine, without trial or other consideration of the merits of their claims. It will also result in summary dismissal of any future-filed suits. In addition, the atomic veterans' civilian counterparts will be deprived of the forum of their choice and of their Seventh Amendment right to a jury trial by the bill's mandate that civilians' actions would be handled in accordance with the procedures of the Federal Tort Claims Act.

NARS perceives no motivation for this legislation other than to further emasculate the rights of atomic veterans and insulate the atomic bomb test actors from any accountability for their acts. The Government's contracts with the contractors immunized by the legislation already require the Government to defend any contractor. Similarly, the Government is obligated to reimburse the contractors for litigation costs and attorneys' fees. (_Id._). Therefore, the only conceivable purpose of the proposed legislation is the _undisclosed_ purpose of eradicating the substantive liability of the contractors _with no corresponding compensation to the victims of their acts_. With respect to the latter, NARS rebukes those who propose and support legislation drafted so as to appear to be solely procedural in effect, but which in fact has drastic substantive consequences.

The legislation would add yet another disability to the legal rights of the veterans who were forced to participate, many as "guinea pigs," in the atomic bomb tests. Notably, the Veteran Administration has denied over 99% of all atomic veterans' claims. The combination of the V.A.'s policy of denying atomic veteran claims, the Feres doctrine, and the proposed legislation condemns the victims of the atomic bomb tests to a lifetime of uncompensated disability without any recourse to the courts. With the exception of the Marshalese and other South Sea islanders, no legislation has ever been proposed or passed to compensate the military or civilian victims of the atomic bomb tests.

Nowhere in the proposed legislation, or in the statements submitted by the Departments of Justice and Energy, is the fundamental preclusive effect of the legislation disclosed or justified. NARS severely questions why the United States should immunize contractors from liability for their own negligent acts. If contractors are blameless, then they should vindicate their innocence in the courts of this country, like all other citizens and entities. Apart from the egregious unfairness of Section 1137 to the victims of the atomic bomb testing program, Congressional committees have recognized that the proposed legislation is of dubious constitutionality.

IV. CONCLUSION:

NARS vigorously opposes and condemns any legislation calculated to place further restrictions on the already limited rights of atomic veterans to seek compensation for the deaths and disabilities they have suffered from improvident decisions made during the atomic bomb testing program. This legislation singles out the class of atomic veterans, whose legal rights are already crippled by the Feres doctrine, and delivers a coup de grace. It says to our disabled veterans -- ""Not only can you not sue the government for cancer, you cannot sue anyone!" NARS submits that if any legislation ought to be considered concerning the liability of atomic bomb test participants, it ought to be to eliminate the bar of the Feres doctrine to suits against the U.S. government in atomic veteran cases or to compensate the victims of the United States' improvident decisions.

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BIOGRAPHICAL SKETCH - FRED COLEMAN THOMPSON

In 1942 I enlisted in the Navy as soon as I turned seventeen. World War II was on and I couldn't wait to get into action. After boot camp and service school I was assigned to the carrier U.S.S. Intrepid.

I took part in battles from Kwajalein to the first raid on Truk, where we were torpedoed. Then I was transferred to the U.S.S. Kenneth Whiting, a seaplane tender, seeing action in taking Eniwetok, Saipan, Peillielu, the Philippines and Okinawa. At Okinawa we were Kamikazied. After the war we were the first American ship into Sasebo, Japan, where I received my first shot of Radiation.

The Kenneth Whiting was then assigned to Operation Crossroads, a series of three atom bomb shots to be at Bikini. The operation was a fiasco from start to finish. Shot Able was a mid-air shot of 20 Kilotons. We watched it from approx. 6 miles off; four hours later we were anchored back in the lagoon with no regard for safety. Our evaporators made fresh water from the contaminated water we bathed in, drank, cooked with, and used for sanitation purposes.

Test shot Baker was even worse; an underwater shot showered the lagoon and the fleet with radioactive debris. Stanford L. Warren, the medical advisor to the radiological section of Operation Crossroads, warned that "Contamination of personnel, clothing, hands, to even food can be demonstrated readily in every ship in the fleet in increasing amounts day by day."

Test shot Charlie was cancelled. Scuttlebut said the entire fleet was so radioactive we weren't going to be admitted to the U.S. We did jetison a lot of radioactive gear.

During the tests we weren't told anything about the damaging effects of radiation. Two red spots appeared on my right arm and one on my chest. I asked our ship's doctor about the spots and he treated me for heat rash, with calamine lotion.

I was discharged in December, 1946; my ship had not yet been "decontaminated", but the Navy, as usual, ran up the "well done" flag.

(over)

About sixteen years later I began to have trouble with my muscles and joints, especially in my wrists, forearms and shoulders. The problems and pain have intensified until I am now in constant pain and walk with difficulty using a cane.

Last month I heard Dr. David Bradley, author of "No Place to Hide" and Dr. Donnell Boardman, of the Center for Atomic Radiation Studies, speak at M.I.T. in Boston. There is no hope for those of us who were exposed unless the laws of physics can be changed.

There is also no hope for those who follow after us if we keep releasing atomic radiation into the air - even the underground tests vent somewhere.

If we continue on our present course we will have a decreased life span - the average age of death for an atomic veteran is 52 years; and birth defects will become the norm. We must stop this madness, and stop it now.

Gentlemen, I urge you to right this wrong, and to prevent future wrong-doing.

Fred C. Thompson

November 4, 1985

Thursday, January 17, 1985

What Missile Firms Gave in Senate Races

Washington

Political action committees sponsored by leading contractors for the MX missile and the so-called Star Wars defense program contributed nearly $1 million to Senate candidates last year, a private research group said yesterday.

[redacted]

The Center on Budget and Policy Priorities, a non-profit research group formed in 1981, analyzed Federal Election Commission data that showed 18 leading contractors for the Star Wars anti-missile program and the MX contributed $931,905 to Senate races during the election campaign.

The MX has been one of the most hotly debated defense issues in Congress.

Star Wars, known formally as the Strategic Defense Initiative, has become a major issue in potential Soviet-American arms control negotiations, and the Pentagon has estimated that research alone on the program will cost $26 billion during the next five years.

Seven members of the Senate Armed Services Committee who faced re-election in November received $359,631 from the contractor PACs, 35 percent of their total contributions, the center said.

Five members of the Senate Defense Appropriations Committee received $205,750, or 22 percent of their totals, it said.

Republicans received 72 percent of the total contributions form contractor PACs, the group said.

The biggest single contribution to a senator from any one source was $12,700 given to Senator David Pryor, D-Ark., by the LTV Aerospace Corp. of Dallas, Texas, the organization said.

Star Wars contractors:

The Boeing Co. of Seattle, Wash.; the General Electric Co. of Fairfield, Conn.; the Grumman Corp. of Bethpage, N.Y.; Honeywell, Inc., of Minneapolis; Hughes Aircraft Co. of El Segundo; Litton Industries, Inc. of Beverly Hills; Lockheed Aircraft Corp. of Burbank; LTV of Dallas; Martin Marietta Corp. of Bethesda, Md.; the McDonnell Douglas Corp. of St. Louis; Rockwell International Corp. of Pittsburgh; TRW, Inc., of Cleveland; and Westinghouse Electric Corp. of Pittsburgh.

MX contractors:

The Avco Corp. of Greenwich, Conn.; Boeing; General Electric; General Telephone and Electronics Corp.; Hercules, Inc., of Wilmington, Del.; Honeywell; Martin Marietta; Morton Thiokol, Inc., of Chicago; the Northrop Corp. of Hawthorne; Rockwell International; TRW; and Westinghouse.

United Press

How Star Wars plan has helped Lockheed

A20 The Sacramento Bee • Friday, September 2, 1983

Pending Legislation

Atomic Vets Accuse UC Of Trying To Block Suits

By Mike Castro
Bee Staff Writer

Attorneys for veterans of atomic testing accused the University of California Thursday of sponsoring federal legislation to stop former military personnel from suing for illnesses they say were caused by nuclear bombs tested in the atmosphere.

"The effect (of the legislation) is to deny these people any remedy whatsoever," said San Francisco attorney Thomas Brandi, who is suing UC for about 10 families of so-called atomic veterans.

Brandi's statement preceded a press conference scheduled in Oakland today by veterans groups, widows and attorneys to voice their opposition against the congressional bills.

Suits seeking millions of dollars in damages have been filed against UC regents in behalf of thousands of military personnel and civilians since atmospheric atomic testing began in 1945, said UC general counsel Donald Reidhaar. No specific number was available, Reidhaar said.

Brandi and Gordon Erspamer, attorney for the National Association of Radiation Survivors, said they believe the legislation developed from university officials asking Rep. Robert E. Badham, R-Newport Beach, to submit a bill.

However, university officials denied they sponsored the legislation pending in Congress which would prevent veterans from suing UC and other private contractors that built nuclear weapons.

University lobbyist Peter Goldschmidt acknowledged from his office in Washington, D.C., that the bills in question grew out of discussions between congressional staffers and officials from nuclear labs, some of which are managed by UC.

And once the legislation was under way, UC supported it, Goldschmidt said.

The weapons were built under contract between the federal government and UC, and other private contractors such as the Sandia Corp.

Brandi said the Veterans Administration does not recognize that exposure to atomic testing leads to diseases like cancer years later. Veterans are unable to sue the government directly now because of current law.

"By preventing them from suing the contractors, the net effect is to deny them any remedy whatsoever," said Brandi.

Although the initial bill is still in the House, a similar bill, written by U.S. Justice Department lawyers later, has passed the Senate as S-1107, said Goldschmidt.

Reidhaar said UC has always believed it helped develop atomic bombs as an agent of the government, not as an independent party. The question is a matter of principle and not economics for UC, Reidhaar said. Contracts with the federal government from 1945 to the present say that the government is obligated to pay for legal defense and any judgment for the nuclear weapons development program, he said.

Governor Vetoes Tougher Penalty

Bee Capitol Bureau

Gov. Deukmejian, normally one of the state's strongest advocates of tougher criminal penalties, vetoed a bill Thursday that would have increased the minimum fine for consumption or purchase of an alcoholic beverage by a minor.

The measure, by Assemblywoman Gwen Moore, D-Los Angeles, would double the minimum fine to $200 and require offenders to perform community services.

The governor said in his veto message that while he agrees with the purpose of the measure, "the nature of the offense does not warrant the penalty imposed by the bill."

Section in New Military Bill Limits Suits in Atomic Tests

By STUART TAYLOR Jr.

Special to The New York Times

WASHINGTON, Nov. 3 — A measure that slipped through Congress virtually unnoticed in September apparently makes it impossible for veterans and their relatives to win lawsuits seeking compensation for cancers allegedly caused by atomic weapon tests.

The new legislation gives Government contractors immunity from liability for any harm done in the atomic weapon testing program, including cancers caused by radioactive fallout.

A result will apparently be to wipe out all pending court claims against the contractors, but not claims against the Government. Legal experts estimate that lawsuits involving more than a thousand military and civilian plaintiffs will be affected.

Because the Supreme Court ruled in 1950 that the Federal Government could not be sued for injuries "incident to military service," the new law leaves veterans who have cancer and who think their cancers were caused by fallout from the tests with nobody to sue.

Civilians Also Affected

The law, part of the bill signed by President Reagan last month to authorize $297 billion in Defense Department programs, also raises new hurdles for civilian fallout victims who have sued contractors in connection with the atomic testing program.

The five-paragraph section of the bill converts any suit against an atomic testing contractor into a suit against the United States.

Most civilian suits have been against the Government, but some civilians have also sued private contractors, partly to take advantage of state laws providing trial by jury and the opportunity to seek punitive damages.

Now all plaintiffs, as well as thousands of potential plaintiffs in this growing area of litigation, will be relegated to suing the Government under the Federal Tort Claims Act, which provides no right to trial by jury, no possibility of punitive damages and, in the case of military veterans, no chance of winning.

Suits by 100 Veterans

According to an article to be published Monday in The National Law Journal, about 100 veterans or families of deceased veterans have sued such atomic testing contractors as the Sandia National Laboratory in Albuquerque, N.M., the University of California and various corporations.

The Law Journal also says that thousands of civilians are seeking billions of dollars in damages in suits in California, Colorado, Nevada and other states.

The veterans sued the contractors, whom they accuse of giving the Government bad advice that led to inadequate safety measures, in the hope of finding a way around the Supreme Court decision blocking such suits against the Government.

The Government has denied liability for various reasons, including lack of proof that the weapon testing caused any injuries or cancers.

The Government stands to save money under the new law because its contracts with private concerns that participated in the atomic testing program provide that the Government must reimburse the contractors for any liability they might incur for harm done by the testing.

Contractors Lobbied for Law

Despite the reimbursement provision, some contractors lobbied for the law as a way of avoiding the publicity and inconvenience of being sued.

The measure, similar to a proposal that died in the House in 1983, was added to the military authorization bill in the Senate and ushered quietly through Congress in September, with Administration support. Several Congressional aides and Administration officials said they did not know whose idea it had been to use this vehicle. A Congressional aide who attended the House-Senate conference on the Defense Authorization Act said there was no discussion of this provision.

Justice Department officials said the Administration had supported the legislation because the contractors should not have to answer in court for doing the Government's bidding.

Plaintiffs' lawyers said the legislation was designed to derail lawsuits.

Action Called 'Underhanded'

"Nobody as far as I know of in the atomic veterans' community knew about the bill until after it was passed," said Gordon P. Erspamer, a San Francisco lawyer who represents some of the veterans. He said the provision had been slipped through Congress in an "underhanded" way, to deny potential opponents a chance to lobby against it.

The United States conducted nearly 700 announced atomic tests at sites in the Pacific Ocean and in Nevada from 1945 to 1980. Estimates of the number of military personnel and civilians close enough to be exposed to low-level radiation range up to a million.

Suits alleging injuries from atomic testing are of relatively recent vintage because cancers caused by low-level radiation do not manifest themselves until many years later.

The only case plaintiffs have won so far, according to a Justice Department official, was a Federal court decision in May by District Judge Bruce S. Jenkins of Salt Lake City that fallout from poorly supervised atomic bomb tests in the 1950's caused at least nine cancer deaths in rural communities in Utah and Arizona.

That decision awarded $2.66 million to 10 plaintiffs and opened the door for suits by more than 1,000 other alleged victims or their survivors. Now on appeal, the case would not be affected by the new legislation because the only defendant was the Government.

WRITTEN TESTIMONY BY THE NATIONAL ASSOCIATION OF RADIATION SURVIVORS ON SENATE BILL 707 BEFORE:

UNITED STATES SENATE
COMMITTEE ON VETERANS AFFAIRS
CHAIR: HONORABLE SENATOR FRANK MURKOWSKI
RUSSELL SENATE OFFICE BUILDING
NOVEMBER 14, 1985

MR. CHAIRMAN AND MEMBERS OF THIS COMMITTEE AND GUESTS:

Our association, representing both civilian and veteran survivors of the Nuclear Weapons Testing Program, is honored to be invited to address the legislation proposed by Senator Paul Simon, the Atomic Veterans Relief Act (S. 707). This written statement will expand on the brief oral testimony presented by our Administrative Director, expanding on each point raised and indicating in detail the changes our association believes would be necessary to provide adequate relief for atomic veterans and their surviving widows and children. We wish to note that the complete text of S. 707/HR 1613 was circulated among our two dozen Board members across the country, and their comments and suggestions, drawn from their own experience as atomic veterans, atomic widows, and/or atomic parents of genetically-affected children, are incorporated herein and are an important part of our testimony.

First of all, we congratulate the authors of this bill, its sponsors, and its co-sponsors for the careful wording of each section of the bill. NARS was gratified to see a more adequate latency period for appearance of radiogenic diseases, a wider range of radiogenic illnesses than former legislation, and a mechanism to expand the range of illnesses to be compensated in the future, as research exposes other prograssive diseases that are radiogenic. We were pleased to find the long overdue acceptance of responsibility for abnormally large numbers of children with birth defects parented by atomic veterans, and the use of blood chromosome tests on atomic veterans to demonstrate this link with radiation exposure. The Outreach, Screening, Research and Registry provisions are also long overdue, and welcome, placing atomic veterans on a par with veterans exposed to chemicals, such as dioxin, in military experience.

It is appropriate here, before stating our criticisms of S 707, to note a few of the milestones in research on radiation health effects which form the basis for this bill to compensate veterans exposed to radionuclides in service. Just in the past two years, these include:

I] The Japanese A.-Bomb data, upon which the Veterans Administration has exclusively relied in its adjudication of radiation claims, has been found to be seriously flawed, and to UNDERESTIMATE the hazard of radiation exposure by a factor of ten, so that low levels of radiation are 1000% more damaging than the National Academy of Science's BIER III Report (1980) has stated. It is also clear that GAMMA radiation, not neutrons, was the lethal factor in Japan, and that ANY exposure is to be considered unsafe. (1)

II] Two Government-financed studies on mortality of atomic veterans, the Multiple Myeloma Study,and the recent "Mortality of Nuclear Weapons Test Participants" study have been found to be seriously flawed by the Office of Technology Assessment and independent scientists. In the former, a seriously inadequate sample was utilized; in the latter, a totally inappropriate "Control" group was used, so that, in plain words, apples and oranges were compared. (2,3)

III] A much wider range of progressive diseases, in addition to several more cancers, has been documented as sequelae to low-level radiation exposure, in carefully controlled studies here and abroad. Other diseases include diabetes, cardiovascular disease, stroke, hypertension, arteriosclerosis, athersclerosis, arthritis, cataracts, and stomach ulcers. (4,5,6,&7) Finally, the range of radiogenic illnesses for which the Japanese Government (based on findings by Japenese scientists and the United States funded Radiation Effects Research Foundation) pays compensation and offers free health care, includes some eleven classes of progressive diseases. The list is attached to this testimony.

IV] A series of studies on the health of nuclear workers at DOE facilities involved in nuclear weapons research and development has found excess cancers and other diseases at eight of the twelve plants studies. The workers did not receive exposure in excess of present nuclear industry limits, but adverse health effects are well documented. (8) These findings have been kept under wraps, while the Japanese A-Bomb data, based on mathematical guesses of very high doses extrapolated down to the low-dose range, is still used as the basis for Veterans Administration decisions.

V] Chromosome research on exposed persons as a basis for determining dose appears to be a better basis than the Dose Reconstructions prepared by the Defense Nuclear Agency, as there is a linear response between dose and chromosome damage even decades after exposure (9, 10, 11) There is, as well, direct link between chromosome aberrations and genetic problems in the children born to atomic veterans. Our testimony will present examples below.

We will now expand the criticisms presented in our oral testimony concerning the provisions of S. 707:

1] The arbitrary latency of 40 years has absolutely no foundation in medical research. Only this year did we remember the forty years which have passed since the A-Bombs were dropped on Japan. Thus other disease entities may yet appear as this population ages and as the survivors grow into old age. We believe there should be NO latency period specified.

2] Likewise, as already noted, there is no scientific research basis for limiting the list of diseases to those specified. Radiation injury is a process which affects all bodily systems. Delayed effects include both tumorous (cancer) and non-tumorous forms of damage, such as a plastic and hypoplastic processes which lead to sterility, anemia, gastrointestinal diseases and premature aging found in atomic veterans, and sclerotic processes, such as keloids, cirrhosis, dermatitis, cataracts, and the arteriosclerosis and athersclerosis already noted. A final process is dyshormonal, producing thyroid diseases, endocrine function abnormalities, and so on.

3] NARS is convinced that the V. A. administrator cannot determine within a period of 120 days which additional conditions should be included in those accepted as radiogenic. Instead, NARS recommends, the use of the attached list of diseases approved for treatment and compensation in Japan as the Veterans Administration's basic list (see Attachment I) to be added to on a yearly basis as research results are reported in peer-reviewed journals on other radiation illnesses.

4] NARS has grave concerns about the application of the doctrine of "Reasonable Doubt" as discussed in S. 707. We believe the statement that reads "Benefits may not be paid under this section to a veteran with respect to a disease described in subsection (b) of this section where there is affirmative evidence that an etiology other than radiation exposure is the cause of the disease, as determined ty the Administrator." should be deleted as any disease that is caused by radiation can have another etiology (e.g. cancer is caused by smoking, heart problems can be hereditary, etc.). We believe that the latter statement should put more emphasis on the reaso[illegible] doubt theory as intended by the Congress and less em[illegible]n the substantial doubt theory as proffered by the Veterans Administration adjudicators in denying claims based on the lack of reasonable doubt.

5] Our atomic widows are unanimous in urging that death allowances to survivors (DIC benefits) be increased, as the present schedule is extremely meager. Further, with the loss of Education Benefits under Social Security for dependent children under this administration, widows are unable to assist their college-age children to obtain the higher education needed for advancement in our technological society. NARS urges that this section be rewritten to increase DIC benefits and provide educational benefits for dependent children of atomic widows. Bringing DIC benefits to the level of service-connected disability compensation would be a first welcome step.

6] As regards benefits under SCDD, we recommend that benefit payments be RETROACTIVE for any veteran who has a claim pending for service-connected death or disability (SCDD) citing any of the diseases set forth in S. 707.

7] NARS strongly supports the provision in S. 707 which subjects the VA's regulations to judicial review under the Administrative Procedures Act. Absent such a provision, the Veterans Administration can proscribe whatever regulations it desires including any that CONFLICT with the express intent of the legislation, as affirmed in GOTT vs CLELAND, D.C. Circuit Court of Appeal, 1985.

8] We believe it is crucial to tighten the section on "Presumption". In the experience of the majority of our membership of atomic veterans and their widows who have had claims denied for radiation injury (and we are all aware that only 14 claims out of 4400 filed for radiation damage have been allowed) the VA adjudicators do not understand "Presumption" and usually misapply it. Many adjudicators have the mistaken belief that when a presumption does not apply, a MANDATORY denial of the claim must follow. We believe a sub-section should spell out specific training for V.A. Adjudicators in the area of presumptions and what they mean.

9] S. 707 has the following shortcomings:

a). We are concerned that the thrust of the legislation should be to COMPENSATE atomic veterans, rather than set up a large social service administration providing information and counseling. We urge that compensation, not social services be the focus of this bill. We recommend that, in lieu of setting up such services, priority be given to monetary payments to affected veterans and their surviving families.

b). S. 707 should provide for chromosome studies of peripheral blood of any atomic veteran who suspects genetic damage to offspring due to his/her radiation exposure.

Provision should be included for the use of "split Samples" of the blood, one to the V.A. hemotology unit, and one to an independent laboratory.

c). S. 707 omits valid, independent epidemiological studies of the morbidity of atomic veterans as compared to an unexposed matched cohort of veterans never exposed to radionuclides in service.

10] NARS wishes to comment on the Fact Sheet accompanying the introduction of this bill, in which the official Defense Nuclear Agency Dose Reconstructions are termed "meaningless". We concur completely in this assessment. We will cite a few examples of many coming from our membership:

Two (deceased) Bikini veterans were given dose reconstructions from their service at Operation Crossroads of 0.24 Rad/Rem and 0.14R., an amount deemed by the Veterans Administration in its denial letter, as "insufficient to cause cancer". Claim # C-249 42 530, prior to his death from a radiogenic lung cancer, had his dose reconstruction done by a qualified health physicist. His dose was "at least 10.4 R" or fifty times that of the figure of the D.N.A. The other veteran claim Number XC 133 23 245 was found to have between 3.28 and 20R, average, 12 R, or 85 times the D.N.A. dose estimate. A Nevada Test Site atomic veteran was informed by Reynolds Electric that he had a dose of 0.10R. A qualified Health Physicist found it to be from 6R to 11R, of sixty to one hundred ten times the REECO Figure.

11] On the issue of Genetic defects in the offspring of atomic veterans, NARS wishes to submit the following report:

For the past twenty years, cytogeneticists in Japan, the United Kingdom, and the United States have reported the presence of stable abnormalities, such as rings and dicentrics, in the peripheral blood drawn from those exposed to radiation. Kumatori (1965) Sasaki (1970-71) Ishihara (1970), found similar levels of these abnormalities in survivors of Hiroshima/Nagasaki and fishermen exposed by the 1954 Bravo Detonation. These aberrations are clearly dose dependant, and persit for decades. The same data has been reported on the Radium Dial Painters, and on the Marshallese natives also exposed at Bravo, as well as among workers at a nuclear dockyard. (see 13,14,15,16,17). Among its own members, NARS has encouraged the veteran who has parented genetically affected children to obtain a chromosome analysis, particulary since a mailed questionnaire survey to several hundred atomic veterans disclosed an incidence of adverse birth outcomes of five times expected--a 25% incidence of severe birth defects in the children born AFTER service at a nuclear detonation. We have received permission from the atomic veterans whose chromosome studies are appended to present this committee with our preliminary findings. In every case, where the offspring had genetic defects, the veterans displayed abnormal clones of chromosomes, with aberrations related to radiation exposure.

The four attachments are from the following individuals:

John Patrick Delay, of New York:

Mr. Delay was exposed at Sandstone, in 1958, and has the following health problems; constant muscle pain and weaknesses, respiratory problems. His children have the following defects: Alopecia (baldness in chidhood) and respiratory illnesses.

John Burke, of Colorado:

Mr. Burke was exposed at Bikini in 1946, aboard the Bowditch and has the following health problems: skin cancer, tumors on the colon, thyroid problems, high blood pressure, degenerative spine disease. His children suffer from: Meuniere's Syndrome, asthma, constant tumors on their bodies, eye problems.

Frankie Wheaton, of Mississippi:

Was exposed at operation Hardtack and other shots in the late fifties in the Pacific. He suffers from premature aging, arteriosclerosis, degeneration of the bone, and depression. His only child was born with a cleft palate and is retarded.

Alfred San Chez, of Colorado:

He was exposed in 1949 in the Pacific in the Greenhouse Series. He suffers from diabetes, high blood pressure, had a heart attack at age forty six. His children include one who has had anemia from birth, and a daughter with spinal problems. He also has a daughter who, without any deformaties of diseases herself, gave birth to a child with a cleft palate and a baby with a rare respiratory genetic disorder. Another grandchild is retarded and has unusually tiny hands and feet for his size.

Robert Farmer, of Illinois:

An Atomic Veteran with many radiation caused health problems who is present at the hearing to answer any of your questions concerning his genetically affected children during the oral testimony.

We wish to emphasize the necessity of every atomic veteran having a valid chromosome study done on the lymphocytes of his/her peripheral blood, in every case where offspring exhibit birth defects of a genetic nature. This must be available at no cost to the atomic veteran.

We would like to conclude our remarks with the sincere hope that the changes we propose will be incorporated into the Atomic Veterans Relief Act, and that the House and Senate will cooperate to pass this much needed legislation. It is interesting to note that the Canadian government has seen the justice of the atomic veteran issue in its country, some of whose veterans were exposed at our Nevada test site. On February 14, 1985, their Minister of Veterans Affairs, George Hees, announced he has recommended that any veteran who, upon examination, has any illness which COULD HAVE BEEN CAUSED BY RADIATION will be given absolute maximum benefit of the doubt to the veteran and will be awarded a very generous pension by the Canadian Government. We urge our Congress to do the same.

Once more we wish to thank you for this opportunity to express our thoughts;

FOR THE BOARD OF DIRECTORS
Reason F. Warehime Sr
REASON F. WAREHIME
Chairman

Page 9.

Written Testimony of the Board of Directors of
The National Association of Radiation Survivors
CONTINUED:

FOOTNOTES:

1. Science, vol 212, May 22, 1981; p900-03 New York Times, Mar.18, 1983; See also Loewe, W.L., and Mendelsohn, E. 1982 "Neutron and Gamma-Ray Doses at Hiroshima and Nagasaki: Nuclear Science and Engineering: 81, 325-350.
2. Science, Aug. 19,1983, reporting on the Office of Technology Assessment's analysis of the National Research Council Study, Multiple Myeloma among Atomic Veterans at Nagasaki, July 16, 1983.
3. Mortality of Nuclear Weapons Test Participants NRC, June 4, 1985, And critique in NARS Press release, June 17, 1985
4. Matanowski, G. et al: The Current Mortality Rates of Radiologist & Other Physician Specialists: Specific Causes of Death; American Journal Of Epidemiology, Vol 101, No. 3, 1975, pg. 199-210.
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6. Kato, H. et al, Late Biological Effects of Ionizing Radiation, Vol. 1. Proceedings of a Symposium, Vienna, Austria, March 13-17, 1978. Int'l. Atomic Energy Agency, p. 27
7. List is attachment 1.
8. Alvarez, Robert; Occupational Radiation Health Risks: Foklore and Fact ; June 1985, Environmental Policy Institute.
9. Bates, H.J. et al, Radiation-Induced Chromosome Aberrations in Nuclear Dockyard Workers, Nature, vol. 277, Feb. 15, 1979, p.531-34.
10. J.T. Boyd, Chromosome Studies on Women Formerly Employed As Luminous Dial Painters. British Medical Journal, Vol 1, Feb. 12, 1966. pp 377-382
11. Conrad, R.A., et al. Review of Medical Findings in a Marshallese Population Twenty Six Years After Accidental Exposure to Radioactive Fall-Out. Brookhaven National Laboratory Publication 51261, pp 32-3.
12. Lambert, Susan; The Medical Evaluation of Atomic Veterans With a Diagnostic Protocol, RADIATION RESEARCH INSTITUTE, Feb. 1983 App."A".

FOOTNOTES: Continued

13. Sasaki, M. "Radiation-Induced Chromosome Aberrations in Lymphocytes: Possible Biological Dosimeter in Man", Biological Aspects of Radiation Protection, Tokyo, 1971.

14. Ishihara, T., "Chromosome Aberrations in Human Leukocytes Irradiated in -vivo and in-vitro" Acta Haemotologica Japnoca, 1970

15. See 10. above.

16. See 9. above

17. Ibid footnote 11.

18. Commons Debate, Feb. 14, 1985, p 2342, Canada. (Attached).

NATIONAL ASSOCIATION
OF ATOMIC VETERANS

JOHN PATRICK DELAY
7 Cottage St.
Saratoga Springs, N.Y. 12866
N.Y. State Coordinator NAAV
(National Association of Atomic Veterans)
518-584-5153

Dear Sirs: N.A.R.S.

Inclosed you will find Medical Report from Dr Sandberg I thing it will help our cause you may use it and my Name as you see fit. I have authorised Dr Sandberg to contact Dr Boardman of CARS. to discuss the report with him. I have sent copy to N.A.A.V and Anthony Guarisco of (N.C.R.C)

also inclosed my application and $15.00 membership.

Sincerely
John Patrick Delay

ROSWELL PARK MEMORIAL INSTITUTE

Buffalo, New York 14263
(716) 845-5752

Avery A. Sandberg, M.D., Chief
Departments of Genetics
and Endocrinology
Division of Medicine

716 [illegible]

March 27, 1984

Mr. John Patrick Deloy
7 Cottage Street
Sarasota Springs, New York 12866

Dear Mr. Delay:

A blood sample examined by us for its chromosome constitution obtained on 2-6-84 revealed that the sister chromatid exchange (SCE) levels were within the normal range, with a mean of 4.2 exchanges per cell and a range of 0-8. These results are perfectly normal and indicate no recent exposure to toxic agents capable of inducing high SCE levels.

Examination of the chromosomes for changes revealed definite abnormalities in 24% of the cells, this being definitely outside the normal range, which usually should not exceed 5-10% of the cells. These abnormalities included loss or extra chromosomes in some of the cells, as well as one cell with a translocation. Per se, the changes are not what as known as clonal in nature, but do indicate a definite abnormality in the cells.

If you wish to discuss these findings further, please do not hesitate to contact me.

Best regards.

Sincerely yours,

Avery A. Sandberg, M.D.

AAS/clr

ATomic VeTeran

42 Hillside Drive
Denver, Colorado 80215

Carl J. Johnson, M.D., M.P.H.
Research and Consultation
Epidemiology and Health Administration

February 10, 1985

Doris Besikoff, Attorney at Law
3611 North Cherry Creek Drive
Denver, Colorado 80209

Re: Mr. John E. Burke

Dear Mrs. Besikoff:

Mr. John E. Burke, Jr. (birthdate 1-10-28) has served on active duty in the Navy between 7-23-45 and 10-23-47. His service record indicates he was assigned to U.S.S. Hancock (C V -19) which at that time was in reserve at Bremerton, Washington. He was transferred to the U.S.S. Bowditch (AGS-4) reporting on September 29, 1946, two months after the second and final Crossroads nuclear bomb explosion. He boarded the ship when it was at Kwajalein Atoll, about 155 nautical miles southeast of Bikini. The Bowditch left the following day (September 30) for Pearl Harbor, arriving October 8, 1946, and then arrived at Oakland, California on October 19, 1946. On October 24, Bowditch entered the Navy ship yard at Hunter's Point, California and on November 23 Bowditch left Hunter's Point for Norfolk, Virginia where it was decommissioned in January, 1947. Mr. Burke served aboard the U.S.S. Bowditch between September 29 and November 21, 1946.

Although the Department of Navy states "the Bowditch was radiologically suspect" a comprehensive review of all data pertinent to contamination or radiation levels aboard ships have failed to uncover any information on radiation readings on Bowditch. In addition, Bowditch's deck log does not discuss any decontamination operations. The Department of Navy reported that he had a blood count performed on January 10, 1947 as part of an examination in which he was found physically qualified to transfer from the U.S.N.S. Grondal.

The history of the U.S.S. Bowditch during Operation Crossroads describes preliminary surveys of Bikini Lagoon to prepare anchorage charts for use in the operation. This included surveys of Eniwetok and Rongelap Atolls. At 9 a.m.

on July 1. Bowditch observed Test Able air detonation from a distance of about 22 miles. The ship reentered Bikini Lagoon at 6:21 p.m. and dropped anchor. At 8:35 a.m. on July 25, when Test Baker (a shallow underwater detonation) occurred, Bowditch was still anchored at Rongelap some 65 miles from Bikini. Bowditch returned to Bikini on August 1st, entering the lagoon at 1:44 p.m. and dropping anchor at 2:16 p.m.. Bowditch remained at Bikini lagoon throughout August and September 1946.

On September 27, Bowditch left Bikini for Kwajalein, arriving September 28, and left Kwajalein on September 30 for Pearl Harbor, arriving October 8. Although temporarily listed as radiologically suspect, no data has been found which would indicate that the level of radioactive contamination sustained by Bowditch at Crossroads was monitored but "a degree of contamination did occur to virtually all of the non-target ships that entered Bikini Lagoon during late July or August 1946. This was largely caused by radioactive contamination of the lagoon waters following test Baker, and was generally confined to the internal salt water system piping."

The Department of Navy reports that no Bowditch crew members were badged (issued radiation monitoring badges) for the operation. However, two non-crew members aboard the Bowditch were issued film badges but "one individual's badge was either not returned or was rendered unreadable due to adverse environmental conditions" and "the second individual received a recorded radiation exposure reading of 0.140 rem gamma for the day, August 13, 1946". The Department of Navy claims the "highest recorded cumulative exposure for an individual at Crossroads was 3.52 rem gamma". Dr. Karl Z. Morgan points out that beta radiation exposures at Crossroads were 3 to 1,000 times greater than the gamma radiation, so that the one exposure reading on the Bowditch of 0.140 rem gamma also indicated beta radiation levels of 0.420 rem to 140 rem of beta radiation on that day (August 13, 1946). This does not represent only exterior exposures, i.e. a man inhales 20 cubic meters of air daily, and the absorptive surface of the pulmonary alveolae ranges from 125 to 500 square meters in area. Through inhalation and ingestion, beta radiation emitters do enter the blood and lymphatic circulations and provide total body radiation exposure, and this is true for alpha radiation emitters as well. The radiation in the Bowditch came chiefly from the deck and other exposed parts of the ship , and from encrustations on the hull and lining the salt water plumbing in the interior of the ship.

The inhalation of airborne or resuspended fallout radionuclides (as with decontamination procedures) is a more important source of radiation exposure than is external gamma radiation. In an early report the AEC stated "that the major problem in safety is going to lie in this field (the small particles of fallout radionuclides suspended in air) rather than external radiation dosage". Another AEC report states "there is no predictable relationship between radiation levels measured on the ground and the (air) concentration of particles small enough to be retained in the lungs." According to the International Commission on Radiological Protection, the personal air space of individuals will contain concentrations of radioactive particulates 100 to 1000 times greater than indicated by area monitors (ICRP #12).

Dr. Morgan reported that persons in charge of radiation protection at Bikini were informing personnel that the beta radiation hazard would be directly proportional to the gamma hazard and so it would not be necessary to make the beta ray evaluation. He tried to correct this. He had with him about 20 instruments that were well suited to the measurement of the beta/gamma ratio. "Most places aboard ship the beta/gamma ratio ranged from three to ten. Some places it ran as high as 1,000. In many places the ratio was from 50 to 100." "Whenever we found tar, paint, rust, rosin, wood fabric, plankton barnacles, etc. there was a selective absorption of the beta products as against the gamma emitting radioisotopes."

It is well accepted that film badge readings indicate only a small portion of total body radiation exposures, chiefly those from penetrating gamma radiation from directly in front of the badge. Readings from all other directions are attenuated, including those passing through the body to the back of the badge. Virtually no readings are obtained from exposures striking the badge on edge or at acute angles. In addition, film badges record only about one sixth of the beta radiation exposures ,,most of which fail to penetrate the badge covering. Alpha radiaiton, which is 20 times more injurious to tissue per rad than are gamma and beta radiation, does not register at all on film badges.

Further, there were serious problems with the radiation monitoring that was conducted at Bikini. Instruments are often calibrated to high energy gamma ray sources such as cobalt 60. The monitors will not be effective in measuring radiation of different energies. Monitors, like film badges, are one directional. This flaw is not important when these devices are pointed at a point source of radiation, but radiation in a fallout contamination area comes from all directions, even from within. As an analogy, consider a bathroom with a single infra-red lamp that provides some warmth on a cold morning. However, if the entire ceiling, walls and floor of the bathroom were covered with infra-red lamps, all of the same intensity, a person in the room would be quickly roasted. Yet, a photometer will record the same number of lumens as with one lamp, if directed at any single lamp.

Bowditch was in radioactive waters at the lagoon for a total of about two months after the underwater Test Baker. Mr. Burke boarded the Bowditch on September 29, two days after the Bowditch left Bikini, and remained on the Bowditch for about five months. After leaving the Navy, Mr. Burke had an attack of bulbar polio with residual effects. He experienced a very rapid gain of weight from 150 pounds to 228 pounds in nine years (1947-1956), and on one occasion was diagnosed as having hypothyroidism. He developed a basal cell carcinoma which was excised from his right cheek some years ago by Dr. Albert E. Hollister of Lakewood, Colorado. The carcinoma was about 3/4 inch in diameter. Such carcinomas may be caused by exposure to ionizing radiation as well as to exposure to ultra violet rays. He had a bout with stomach ulcers. An examination at Kaiser Permanente on 9-20-83 revealed two sigmoid polyps and diverticulosis of the distal descending colon. He now has degenerative osteoarthritis and sinusitis.

Believing that his exposure to radiation aboard the Bowditch was a factor in his chronic ill health, he has had a series of chromosome tests carried out. His opinion was corroborated by news that a former Bowditch shipmate, Lieutenant Erspamer, had died of myelogenous leukemia. The 1980 National Academy of Sciences report (BEIR report) estimates about seven excess cases of radiation-induced cancer for each case of radiation-induced leukemia. This relationship is useful in estimating the prevalence of other radiation effects in populations exposed to radiation. The 1972 BEIR report estimates a 5% increase in non-specific effects on health from exposures to only 170 millirems per year from x-ray or gamma radiation. Recent research indicates that small dosages of high linear energy transfer radiation such as alpha radiation (as from plutonium) and neutron radiation can induce 9 to 10 times more neoplasms per rad when sustained in many small doses than in a single large dose. Since this enhanced effect is due to poor repair of chromosome damage , effects will include nonspecific effects as well.

A cytogenetics report of the examination of blood from Mr. Burke by the Cytogenetics Laboratory (3800 East Colfax Ave. Denver) found on 9-16-83 that 9 of 44 cells had chromosome aberrations (20.5%). A repeat examination on 12-9-83 reported 11 of 100 cells from the peripheral blood to have chromosome aberrations , or 11%. Reports stated "based on comparison with age and sex matched controls, the chromosome damage observed in this individual is not significantly different than the normal". However, the "control for Mr. Burke" was a physician 14 years older than Mr. Burke, and of a hundred peripheral blood cells examined for the older physician control, there were only five cells (5%) with chromosome aberrations.

A cytogenetics report dated 12-30-83 found 16 cells with abnormalities of 200, or 8%. The Director of the Cytogenetics Laboratory, Dr. Robinson, reported in a cover letter (January 12, 1984) the results of "chromosome studies performed on you and an age and sex matched control. In both cases the numbers of breaks, gaps and abnormalities of chromosome number were within normal limits for our laboratory, namely 5 to 10 %" and "therefore, your chromosome studies could not be called abnormal since they were well within limits of normal." However, a report by Beebe "A-bomb survivors and low-dose radiation effects" reported that Nagasaki survivors with 5% to 10% of cells with any chromosomal aberrations experienced radiation doses between 380 to 550 rads. Those at Hiroshima with 5 to 10% of chromosomal aberrations had sustained doses of about 150 to 300 rads. The normal values, i.e. 0 rad dosage, for both cities were about 1.8% of cells with any chromosome aberrations. A study of uranium miners found that those who were not exposed had a 1.8% prevalence of chromosome aberrations. Those with radiation exposure levels ranging from 0 to 100 working level months had 2.5% of cells with chromosome aberrations, and those with 1,740 - 2,890 working level months had a 5.2% prevalence of chromosomal aberrations per 100 cells.

Among Rocky Flats nuclear plant workers, the workers who were "controls" (had body burdens of less than 400 picocuries of plutonium) had a prevalence of 2.5% of chromosomal aberrations per 100 cells. Those with 51 to 100 % of the maximum permissible body burden of plutonium (20,000-40,000 picocuries of plutonium) had about a 5.5% prevalence of chromosomal aberrations per 100 cells. A study of chromosomal abnormalities in an area of high background radiation (1500-3,000 millirads per year) due to the presence of thorium-containing minerals in the soil found significantly more chromosomal aberrations: 1.2% vs. 0.2%. ($P < 0.01$).

Dr. Sheldon Wolff, Professor of Cytogenetics, University of the City of San Francisco, noted three dicentrics and rings out of 219 cells in a chromosome aberration study. Those numbers were fitted to two different models to calculate radiation exposure. The first model utilized was $Y=KD^2$ with a coefficient of 27.75×10^{-6} per cell per rad^2 for the value of K. The calculation gave a point estimate of 22.2 rads equivalent whole body exposure with a lower limit of 11.6 rads and an upper limit of 36.5 rads. A second model utilizes coefficients used by Perrot and Lloyd of the National Radiological Protection Board in Great Britain, who fed human chromosome aberration data into the quadratic equation, alpha D^2 + beta D + C = 0. (For alpha, 6.19×10^{-6}, beta = 4.76×10^{-4} , and C is the yield in any given experiment.) This approach yielded an estimated equivalent whole body dose of 22.3 rads. Dr. Wolff notes that dicentrics and rings are long-lived aberrations in human lymphocytes.

Based on my education, training and experience as a physician, and my understanding of the human body, and based on my review of medical records, and the reports and correspondence describing the nature and extent of the radiation exposures sustained by Mr. Burke during his assignment aboard the U.S.S. Bowditch, I believe that he has sustained serious injuries from his radiation exposure aboard the U.S.S. Bowditch. I believe that such conditions as decreased resistance to infectious diseases, premature aging, hypothyroidism, basal cell carcinoma, benign tumors of the colon, and degenerative osteoarthritis are related to his exposures to ionizing radiation while a crew member on the U.S.S. Bowditch as part of "Operation Crossroads" and afterward.

Sincerely yours,

Carl J. Johnson

Carl J. Johnson, M.D.

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7. Brandom W, Bloom A, Saccomanno G, Archer P, Archer V, Bistline R, Lilienfeld A: Somatic Cell Chromosome and Sputum Cell Cytology Changes in Humans Exposed to Radon 222 and Plutonium 239 (Progress Report, Dept. of Energy Contract # E (2902) - 3639 Rocky Flats Plant, Golden, CO (1976)

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Standard Form 504

RADIATION EXPOSURE

CLINICAL RECORD | **HISTORY—Part I**

NATURE AND DURATION OF COMPLAINTS (*Include circumstances of admission*)

Veteran claims exposure to atomic radiation during a variety of test shots over a several year period.

HISTORY OF PRESENT ILLNESSES

A: Veteran states that he was exposed to nuclear explosions while in the military.
  1. Veteran states that he participated in 9 or 10 tests
  2. He stated that he was in operation Hard Tack, Oak Shot, at least one aerial shot and many other test over several years. States he can't remember all the names.
  3. He states that he was close enough to the blast to be envolved in fire fighting.
  4. He states he was in open areas near the blast sights.
  5, Veteran states that he moved toward ground zero after some of the blasts and laterally or in other directions as a participant in fire fighting teams.
  6. Veteran stated he remained in areas of the test sights for a total period of 9 months
  7. He is not aware of any unexpected or peculiarty of the trials such as wind changes.

B: At the time of exposure, he stated he was in the Air Force in the Air Defense Command (51st) as a fire fighter.

C: Veteran states that he was issued monitering devices which he used. Apart from nuclear devices he states the only radiation he is aware of is diagnosis X-rays.

D: Veteran states that he has copies of Service records that might document some of the above information.

Additional questioning produced some more history: Veteran states that he was a fire fighter at the time of all of the blasts in the series that he references. He states that he wore goggles for the big blasts and reports that he was able to see the bones in his hands during the larger blasts. He stated he participated in hosing down planes after aerial sampling and then went through decontamination himself after each occasion stating that it often took 2 to 3 hours for him to get rinsed off to where the personnel who [illegible] him (from his discription sound like

(*Continue on reverse side*)

PATIENT'S IDENTIFICATION (*For typed or written entries give: Name—last, first, middle; grade; date; hospital or medical facility*)

WHEATON, FRANKIE L.

426-70-5750

REGISTER NO.	WARD NO.

HISTORY—Part I
Standard Form 504
General Services Administration and
Interagency Committee on Medical Records
FPMR 101-11.803-8
October 1975
504-109

RADIATION EXPOSURE

Standard Form 504

CLINICAL RECORD	**HISTORY—Part I**

NATURE AND DURATION OF COMPLAINTS (*Include circumstances of admission*)

HISTORY OF PRESENT ILLNESSES

portable Geiger counter) were satisified. Patient states that he was told at the time he had considerable exposure, but was given no specific information on dosages. He states that he subsequently received a letter of commendation from Washington for his participation in these series. He is not aware of any acute problems at the time of his exposure or while he was still in the Service. He feels that he has never been the same since Service, in particular his mind is different. He says that his family and friends tell him that he is crazy and that his mind works differently from other people and differently from before he went into the Service. He states that he returned home follwing service and married in 1962. He noted that he broke an arm while in service which still gives him some residuial limitation of motion, with restricted use of the arm and elbow (right arm). He states that a visual problem began to develope about 10 years ago and now he can hardly see. He notes that a female child born in Dec. 1963 was born without a roof in the mouth (cleft palate?) and was treated with surgery. He states that she is not as bright as other children but by going to summer school and special schools she did get through a modified high school curriculum. He states his wife never had any other pregnancies or miscarriages. No tests were ever made for fertility for himself or his wife. He stated that his hair turned snow white at the age of 40, but that he did not have any marked alopecia . He states that he looks older and feels older than his family members of equivalent ages or his friends. He gives an age of 45, but says everybody tell him and he agrees with them that he looks to be well over 60 years old.

(*Continue on reverse side*)

PATIENT'S IDENTIFICATION (*For typed or written entries give: Name—last, first, middle; grade; date; hospital or medical facility*)	REGISTER NO.	WARD NO.

HISTORY—Part I
Standard Form 504
General Services Administration and
Interagency Committee on Medical Records
FPMR 101-11.806-8
October 1975 504-107

U.S. Government Printing Office: 1975 - 381-458/2556

MEDICAL RECORD | **PROGRESS NOTES**

DATE

4-13-84

RADIATION FOLLOW UP — RADIATION EXPOSURE

Veteran's mental hygiene evaluation is incomplete. Psychological and other tests are pending at this time. Eye examination shows a refractive error. The RPR was non-reactive. CBC shows slight elevation of white cells with a normal diff. Basic chemistries appear to be within normal limits except for a minimally elevated CPT. Urine was benign. serium protein electrophorisis was normal. X-ray examination shows degenerative changes to the right elbow. Chest x-ray was normal. Upper GI series was normal. Because of some complaints of abdominal pain with radiation down the inguinal, scrotal areas physical examination of these areas was repeated including a rectal examination and found to be benign as previously. Some medication was prescribed and a barium enema was ordered. 5-7-84, radiation follow up showed a normal barium enema. Upper GI series is reported as showing a moderate sized sliding hiatal hernia and the chest x-ray on re-evaluation does show a number of arteriosclaric vascular changes involving the aorta. The EKG shows an AV block apparently 2 to 1 and a long rhythm strip was requested, patient did not report for the scheduled examination. Hemoglobin electrophorisis on a polyacrylomide gel was performed showing normal type A hemoglobin. Peripheral blood was obtained for peripheral chromosone annlaysis which was preformed by the labrotory at the Memphis VA. A model count of 46 chromosones with an XY karyotype was reported and the cell screen showed a predominately diploid cell population with 2 of the cells showing abnormal changes. One of these showed 45 chromosomes and the presence of a minute and the second showed 46 chromosones in the [illegible] paracentetic [illegible] of a number 1. These changes were considered as probably incindental to the patient's radiation exposure or of an abnormal underlying clone or population of abnormal cells. No major aberrations were noted. A number of other laboratory tests including thyriod function study were ordered, but the patient did not report for them. The patient has been evaluated at the mental health clinic where a phychiatric and psychological evaluation were preformed. It was felt that the examination was complicated because it would appear to be a tendency to fabricate symptoms, exaggerate deficiencies and individual tests or separate tests designed to clarify some of the points produced disparate results. A tentative diagnosis of Malingering with the possibity of Dysthymic Disorder or Depression Reaction was recorded.

5/7/84

ASSESSMENT: A - Post atomic radiation exposure by history with possible chromosome changes and signs of premature aging in a patient who has behavioral problems. These findings are highly suggestive of post radiation induced processes.

B - Hiatus Hernia

C. Post traumatic arthritis (right elbow)

PATIENT'S IDENTIFICATION (For typed or written entries give: Name—last, first, middle; grade; rank; rate; hospital or medical facility)

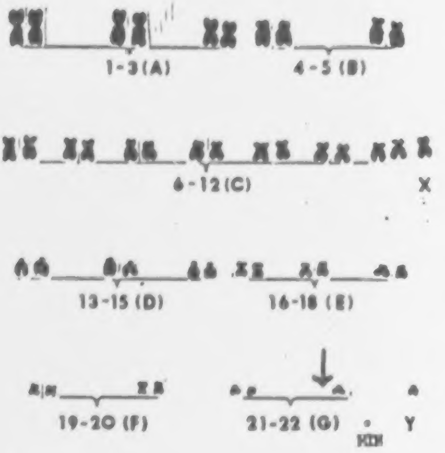
REGISTER NO

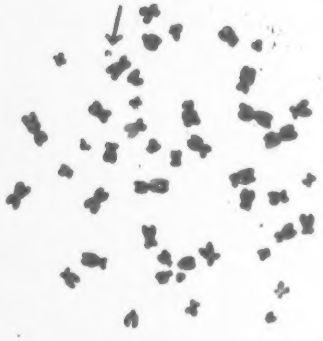
WARD NO

WHEATON, FRANKIE L.
426-78-5750

PROGRESS NOTES
STANDARD FORM 509 (Rev. 11-77)
Prescribed by GSA FIRMR
[illegible]

CHROMOSOME STUDY #CP-3-12-84
WHEATON, FRANKIE


1-3 (A)
4-5 (B)
6-12 (C)
X
13-15 (D)
16-18 (E)
19-20 (F)
21-22 (G)
MIN
Y



45, XY, -G, + minute

31246

University of Colorado Health Sciences Center

University Hospitals
School of Medicine
School of Nursing
School of Dentistry

4200 East Ninth Avenue
Denver, Colorado 80262

SANCHEZ, Alfred
UCHSC #: 847423-1

December 18, 1984

Mr. Sanchez returned to the genetics clinic today. He states that he was on board a ship in the area of the Marshall Islands from 12-2-49 until 6-15-49. During this time there were three bomb tests and he actually saw the blasts. After the blast they walked around the ship with Geiger counters and the ship, he says, was "hot".

Blood was drawn to repeat the chromosome studies after 48 hour culture. Blood drawn from Dr. Ernest Cotton for control.

Arthur Robinson, M.D.
Professor of Pediatrics
Professor of Biophysics and Genetics

April 9, 1985

Mr. Sanchez returned to the genetics clinic today. I reviewed the chromosome findings with Mr. Sanchez. I told him that the results of the 48 hour culture revealed a suggestive difference between his chromosomes and Dr. Cotton's (the control). I stressed again that I could not say whether the difference was significant, and if so, what had caused it.

We will send Mr. Sanchez copies of the records.

Arthur Robinson
Arthur Robinson, M.D.
Professor of Pediatrics
Professor of Biophysics and Genetics

AR/sb

UCHA;
Form #MR
2060.#02,
Rev. 9/81

UNIVERSITY OF COLORADO
UNIVERSITY HOSPITALS
4200 EAST NINTH AVENUE
DENVER, COLORADO 80262

Date: 10/9/84

Name: SANCHEZ, Alfred

Hosp. No.: 941655

DOB: 3/2/30

GENETICS CLINIC ANNEX NOTE

Alfred Sanchez, accompanied by his brother, Albert, was seen in the Genetics Clinic on October 9, 1984.

Mr. Sanchez, a 54 year old Hispanic, came to the Genetics Clinic because of his radiation exposure at 18 years of age (in 1947) on the Marshall Islands during U.S. Government Bomb testing procedures. Mr. Sanchez is unaware of the levels of radiation he was exposed to, although he verified his proximity by his actual citing of "mushroom cloud formations".

MEDICAL HISTORY: Mr. Sanchez states he has experienced a variety of medical problems since 30 years of age. At age 30, Mr. Sanchez experienced a back injury subsequent to lifting heavy objects at his place of employment at the Postal Service. According to Mr. Sanchez, an orthopedic examination revealed a "deterioration of his spine".

In 1976, at age 46, Mr. Sanchez was diagnosed as having diabetes. This is treated by insulin injections.

Mr. Sanchez stated that in 1976 he suffered from a heart attack at work. He was admitted overnight to Porter Hospital.

In 1982 Mr. Sanchez was diagnosed as having high blood pressure. He is being treated with appropriate medication.

FAMILY HISTORY: Mrs. Sanchez, is in good health. Mr. and Mrs. Sanchez have two sons and two daughters. Their 32 year old son, Alfred, is said to have anemia which has been present since childhood. A 31 year old daughter, Yvonne, is in good health. Her son is said to have learning disabilities, slow speech and disproportionately small hands and feet for his body. A 26 year old daughter, Debra, is said to have "spine problems". Debra has two children. One child has cleft palate which was not diagnosed and repaired until four years of age. Debra's other child is two months old, and is said to have a "rare respiratory disorder" for which he was recently treated at Children's Hospital. Debra has had one miscarriage.

Mr. and Mrs. Sanchez have a son, Gary, 22 years old, with "mental problems".

Except for some obesity in a half brother with diabetes, other family members of Mr. Sanchez have no apparent health problems.

Mrs. Sanchez's family history is unremarkable.

DISCUSSION: Mr. Sanchez is very interested in pursuing blood chromosome analysis because of his radiation exposure and subsequent health problems. We detailed these studies which include analysis for chromosome breakage, malformation and sister chromatid exchange. This analysis requires study of 100 cells; therefore, is quite a costly test. Although findings may

Form #318
2600.002,
Rev. 8/81

UNIVERSITY OF CO
UNIVERSITY HOSPITALS

[illegible] EAST NINTH AVENUE
DENVER, COLORADO [illegible]

Date: 10/9/84

Name: SANCHEZ, Alfred

Hosp. No.: 941655

PAGE 2

indicate chromosome abnormalities, these analyses will not define the cause of such chrouosome abnormalities. Further, if chromosome abnormalities did previously exist, such breaks may have healed over time.

Mr. Sanchez, however, elected to have the chromosome analysis regardless of cost and limitations of the test.

Blood was drawn from Mr. Sanchez and from his 51 year old brother, Richard. Richard's blood sample will be used as a control in this analysis. We will proceed with chromosome analysis and request other medical records for our review.

Mr. Sanchez will return for the results.

Susan Kreutzer
Susan Kreutzer
Graduate Student, Genetics

Arthur Robinson
Arthur Robinson, M.D.
Professor, Biochemistry, biophysics, Genetics

SK/db

D 11/5/84
T 11/5/84

cc: David Manchester, M.D.

National Jewish Hospital
and Research Center
National Asthma Center

Cytogenetics Laboratory
3800 East Colfax Avenue
Denver, Colorado 80206
303/398-1510

University of Colorado
Health Sciences Center

CYTOGENETICS REPORT

Date Received 10-9-84 Date Reported 11-7-84 Analysis No. 7770

Patient's Name Alfred Sanchez Date of Birth adult.

Referred By Dr. Robinson

Hospital U. of Colo. Medical Center No

TISSUE ANALYZED

X Peripheral blood
Bone marrow
Other ( )
Amniotic fluid
Fibroblasts

KARYOTYPE SUMMARY

46,XY normal male karyotype
46,XX normal female karyotype
X Other 46,XY male karyotype - see interpretation

72 hr. Test

INTERPRETATION

100 G-banded metaphases were examined. No consistent numerical or structural abnormalities were observed. The following aberrant metaphases were noted: 4/100 cells exhibited chromosome loss (1 with a - #15, 1 with a -X, 1 with a - Y, 1 with a - #19). 2/100 cells exhibited chromosome gain (1 with a + #3, a + #9 and a missing Y, 1 with a + #21). 2/100 cells exhibited chromosome breaks (1 with a break on the #5q, 1 with a break on the #13q22). 1/100 cells exhibited a deletion of the #1q and the #12q. [illegible]

The average sister chromatid exchange per cell = 8.45

Brian Ward
Brian Ward, M.S.
Associate Director
Lynda Bayless
Supervisor

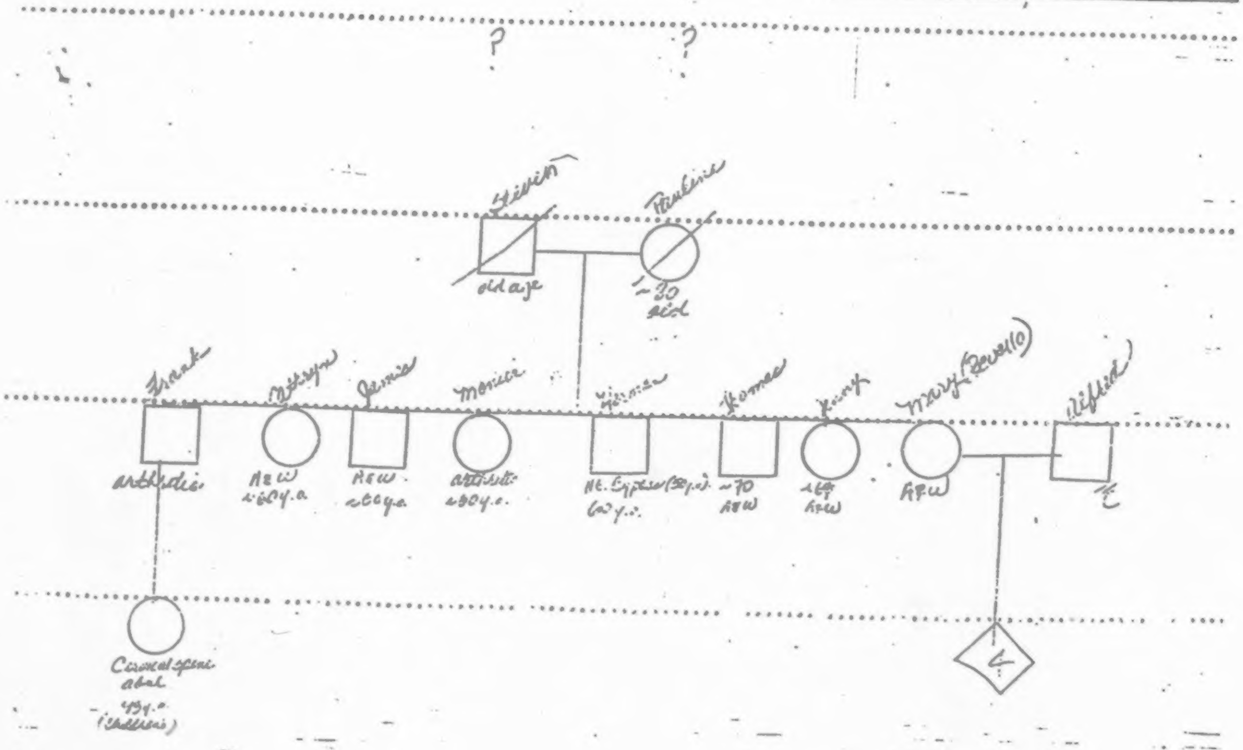
Arthur Robinson MD
Arthur Robinson, M.D.
Director, Cytogenetics Laboratory

formant Alfred Sanchez
"
y S. Trinity

Probard Alfred Sanchez

Family No.

Diagnosis Radiation Exposure


?
?
Steven
old age
Pauline
~30
acid
Frank
arthritis
A&W
~60 y.o.
Jamie
A&W
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Monica
arthritis
~80 y.o.
Mt. Exposure (50 y.o.)
60 y.o.
Thomas
~70
A&W
A&W
Mary (Bevell)
A&W
Alfred
Cervical spine
abnl
~45 y.o.
(children)
4

ite 10.9.94

formant Alfred Sanchez

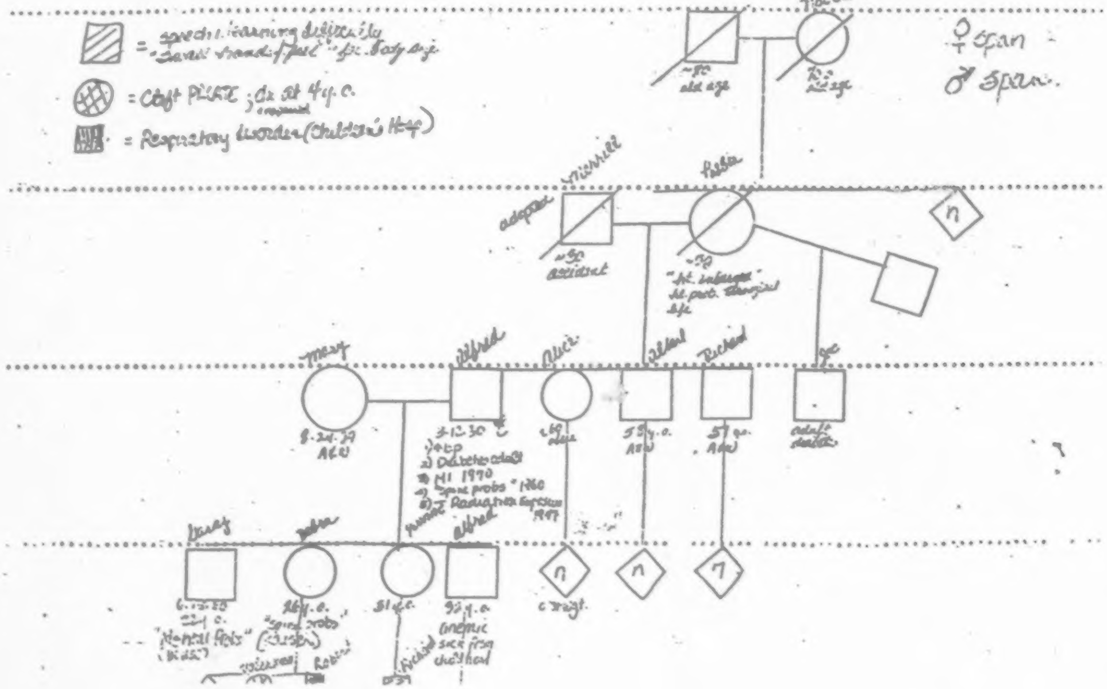
. S. Knight

Hosp. No. 644553 Page 1 of 2

Proband Alfred Sanchez

Family No.

Diagnosis Radiation Exposure



= speech / learning difficulty "Saw it Around / felt" for body ag
= Cleft PLATE ; dx at 4 y.o. repaired
= Respiratory disorder (Children's Hosp)
♀ span
♂ span.
Valentine
~80 old age
old age
Felix
Michael
adopted
~50 accident
~50 "At. unknown" At. part. hospital life
Mary
8.24.39 ACW
Alfred
3.12.30
1) HTN
2) Diabetes adult
3) MI 1970
4) "spine probs" 1960
5) Radiation Exposure 1947
Alice
Albert
55 y.o. A&W
Richard
57 y.o. A&W
Joe
adult deaths
n
n
7
c twigt.
Henry
6.12.55
Debra
Alfred
Richard
59 y.o.
51 y.o.
"spine probs"
"Mental Probs"
William
Robert
chronic sick from childhood

SEE PAGE 2343 for atomic veterans

Some Hon. Members: Agreed.

Motion agreed to, Bill read the second time and referred to the Standing Committee on Communications and Culture.

* * *

[*English*]

PENSION ACT

MEASURE TO AMEND

Hon. George Hees (Minister of Veterans Affairs) moved that Bill C-28, an Act to amend the Pension Act, be read the second time and referred to the Standing Committee on Veterans Affairs.

Mr. Hnatyshyn: Mr. Speaker, I rise at this time on a point of order inasmuch as I have had consultations with the Opposition House Leaders concerning the dealings by the House with this particularly important piece of legislation.

As Your Honour will understand by reading the Bill, this legislation, and the benefits payable under the provisions of the Bill, are effective upon passage. Accordingly, there have been preliminary indications of all-Party support for the general principles of this Bill. In fairness, Sir, I have received the agreement of the New Democratic Party to allow the Bill to pass through all stages with one speaker. I was to get a response from the Liberal Party. I understood that they were receptive and that it was a question of dealing with their critic. I was wondering if it would be possible to have agreement to deal with this Bill through all stages so the matter can be referred to the Senate today.

● (1200)

Mr. Gauthier: Mr. Speaker, in a spirit of co-operation, it is the intention of the Liberal Party to let the Bill go through all stages today in the expectation that, as soon as the Bill is passed, the payments will go ahead immediately thereafter.

Mr. Young: Mr. Speaker, I would just like to confirm what my House Leader has already indicated to the Government House Leader, that my Party is extremely desirous of seeing this Bill go through the House today and be referred to the Senate, possibly by one o'clock.

Mr. Deputy Speaker: Am I to understand, therefore, that there is unanimous consent for the Government House Leader's proposal?

Some Hon. Members: Agreed.

Mr. Deputy Speaker: The Hon. Minister of Veterans Affairs.

Mr. Hees: Mr. Speaker, I would like to commence by thanking the opposition Parties for agreeing to pass this Bill through all stages today. We all agree this Bill will do a great deal for veterans who deserve this kind of treatment, and putting it through today will enable it to become effective very quickly. I know the veterans of this country will appreciate the attitude expressed by all Members of the House in their willingness to see this Bill pass quickly. I thank the two Members who have spoken on behalf of their Party for their generous and co-operative attitude which has been expressed today.

The proposed legislation, Mr. Speaker, which I have the honour to present to the House contains five amendments to the Pension Act which will be of benefit to veterans and their dependants. The first amendment deals with the annual increase in the basic rate of pension. It has been increased each year by the percentage increase of the Consumer Price Index. This amendment will provide that in future the rate of pension will be increased each year by whichever is greater, the percentage increase in the Consumer Price Index or the percentage increase of the average wage of five selected categories of public servants. This change will remedy a situation which for years has been very unfair to veterans because the percentage increase in the Consumer Price Index has often lagged behind the percentage increase gained by these public servants. In 1984 this difference amounted to $611. This change will benefit 90,000 pensioners plus 51,000 spouses, children and orphans.

The second amendment will continue a disability pension at the married rate for 12 months following the death of a pensioner. The reduction to the single rate now begins at the end of the month in which the pensioner dies. This change will remove the shock of an immediately reduced income at a time when the spouse is under the emotional stress of such a grievous personal loss. This change is in line with a provision of the War Veterans Allowance Act which has been in place for years. Some 6,000 widows and widowers are expected to benefit from this change. The third amendment will extend the same right to survivors of pensioners who had been receiving attendance and/or exceptional incapacity allowance. Three hundred widows and widowers will benefit from this change which can only be described as very generous.

The fourth amendment deals with the Pension Review Board, the final stop in the pension process and which is currently facing an eight-month backlog of cases. The legislation will provide for the appointment of up to four additional members to the Board. The appointments will be for six months' duration and as required. This provision will guarantee to our veterans and to the Board that the Department will be equipped to meet the challenge of speeding up our examination processes in every possible way.

The fifth amendment will permit pension entitlement boards to be composed of two or three commissioners, as opposed to the present necessity of having three. This should allow these boards to process a third more cases each year. More importantly, this change opens up the whole question of what happens on a split decision. Past practice has been to turn down the veteran's application whenever a split decision occurred. Once the legislation is passed, every split decision will go in favour of the veteran.

Mr. Speaker, I am proud of this legislation. Every amendment is good news for veterans and their families. Almost as government loans to establish themselves as farmers in Canada.

As the rehabilitation work lessened it was combined with that of the Department of Health and a new Department of Pensions and National Health was formed in 1928. This Department continued to administer veterans' matters until toward the close of World War II, it became evident that an expanded rehabilitation organization would be required. Consequently, in 1944 the duties of the Department of Pensions and National Health were divided. Those that affected veterans were taken over by a new Department which is the Department of Veterans Affairs.

With regard to pensions, up to June, 1916 all military pensions were administered by the Pension and Claims Board of the Department of Militia and Defence under the Pension Act. In 1919 the responsibility for pensions was given to the Board of Pension Commissioners for Canada, then responsible to the Minister of Soldiers Civil Re-establishment. The administration of pensions has remained under that Board, the name of which was changed to the Canadian Pension Commission. Since 1944 the responsible Minister has been the Minister of Veterans Affairs.

Under the 1971 amendments of the Pension Act the Pension Review Board was established to deal with appeals from entitlement and quantum award under the Act. The Board is also authorized to interpret the Pension Act. The 1971 amendments also established the Bureau of Pensions Advocates as a separate organization reporting directly to the Minister. The Bureau is an independent agency established for the sole purpose of providing free legal aid to pension applicants in the preparation and presentation of their claims to the Canadian Pension Commission Entitlement Board and Pension Review Board.

With regard to allowances, the War Veterans Allowance Act was passed in 1930 to provide assistance to Canadian veterans who were suffering economic distress and who, because of the rigours of active service in World War I, were considered to be pre-aged or otherwise permanently unemployable or incapable of self-maintenance. Subsequently the benefits of the Act were extended to others, including veterans of other wars in which Canada had participated, to British and allied veterans, and to widows, orphans, and dependent children, and in 1962, through Part XI of the Civilian War Pensions and Allowances Act, to certain categories of civilians who had served in wartime.

The War Veterans Allowance Board was established in 1936 to replace the War Veterans Allowance Committee which had been established in 1930. The Board acts as a court of appeal for applicants and recipients who are grieved by any decision of a military authority.

I will review the major veterans' affairs developments and legislative changes since 1969. In February, 1970 changes were made to the total disability provisions of the group life insurance contract between the director, the Veterans' Land Administration and the Imperial Assurance Company of Canada, permitting a greater number of seriously disabled veterans to take advantage of the plan. Previously a benefit clause that provided for premiums to be waived in the event of total disability for a period of at least six months had caused underwriters to screen them out of the loan insurance plan. At the above date, the disability benefit was declared optional and many who previously could not obtain coverage could then do so.

● (1220)

In March, 1971, there was a major change that included a 10 per cent increase in disability pensions and a 15 per cent increase in war veterans' allowance rates, and amendments granting special pension status to former prisoners of war of the Japanese.

The new legislation also created, first, the Pension Review Board, an appellant body for the appeals of veterans who are dissatisfied with the decision of an entitlement board; second, the Bureau of Pension Advocates which provides free legal assistance to any applicant or pensioner under the Pension Act.

There were some other amendments as well. In March, 1972 amendments to the war veterans allowance and the civilian war allowance legislation included the exemption as income of cost of living increases of old age security and the guaranteed income supplement.

Again in 1972, cost of living adjustments in pensions and allowances paid to the veterans and their dependants provided for review of pensions and allowances each September and adjustment upward at the beginning of the following year by the increase in the consumer cost of living index during the preceding 12 months.

In February, 1973 amendments to the veterans' treatment regulations doubled travel allowances and accommodation rates for veterans reporting for medical examinations or treatment. In 1973 an amendment to the Pension Act raised the basic rate by 24 per cent and, for the first time, based the basic rate on the average compensate salary of five categories of unskilled employees in the Public Service. The amendment also provided an established relationship between the basic pension and the pension of dependents so that in future years the rates of these dependants will be adjusted in accordance with the established percentages.

In October, 1974 there were other amendments. Previously no allowance was paid for dependent children. The amendment provided for $50 a month for each child less the amount of the family allowance paid on behalf of a child of a widow or widower, or an allowance received and stipulated that the additional allowance paid to an orphan, may be continued to age 25 as long as the child continues his education.

New legislation in 1975 provided equality of status and rights for male and female pensioners. That is, a female pensioner would now be eligible to receive additional pension for husband and children. In 1976 amended legislation provided compensation on a sliding scale tied to the period of time spent as prisoners of war to those who were prisoners of the Germans, Italians and North Koreans. In addition, compensa-

Mr. Deputy Speaker: Mr. Hees, seconded by Mr. Hnatyshyn, moves that Bill C-28, an Act to amend the Pension Act, be read the second time and, by unanimous consent, referred to the Committee of the Whole. Is it the pleasure of the House to adopt the motion?

Some Hon. Members: Agreed.

● (1240)

Motion agreed to Bill read the second time and, by unanimous consent, the House went into Committee thereon, Mr. Danis in the chair.

The Chairman: Order. House in Committee of the Whole on Bill C-28, an Act to amend the Pension Act. Shall Clause 1 carry?

Some Hon. Members: Agreed.

Clause agreed to.

On Clause 2—

Mr. Gauthier: Mr. Chairman, I have a question for the Minister, but first of all I thank him for this Bill and I can tell him that we will support it.

Some military personnel were allegedly subjected to radiation during certain tests in Australia, in Chalk River, which is not very far from Ottawa, and in the Nevada desert. I think the Minister mentioned some time ago in a public speech that these people would be examined by medical staff of the department of National Health and Welfare and, consequently, if it is proven that they suffered injury, they could be covered under the Pension Act. Does the Minister have any intention of bringing in that sort of amendment soon? Perhaps it could be done in committee. Also, will he tell us whether it will be retroactive to January 1, 1985?

Mr. Hees: Mr. Chairman, I am very glad the Hon. Member asked that question, as I have been working on this matter for quite some time. We have contacted as many of these veterans as we possibly could. We are still trying to contact more of the veterans who were subjected to radiation at Chalk River, in the Nevada desert or in the Australian desert. These veterans are now being examined, by doctors of the Department of National Health and Welfare. The Minister of National Health and Welfare very graciously and generously agreed to do this job for me. These veterans are being examined and, as I have said, if the doctors indicate that any serious illness which these veterans have developed in intervening years could have been caused by their being subjected to radiation, I will recommend very strongly that these veterans be very seriously considered for pensions. I think I can assure the hon. Member that if such a recommendation goes forward, a great deal of attention will be paid to it.

Mr. Gauthier: I should just like to persue the matter with the Minister because he did not answer my last question. Would such an amendment be retroactive to January 1, 1985, if indeed some people were found to suffer radiation illness?

Pension Act

Mr. Hees: I do not think it will be possible. It might. I really have not thought about that very much. First we have to find out at the time of the examinations whether the doctors consider that any serious illness they might have contracted could—and I underline the word "could"—have been caused by radiation. We are giving the absolute maximum benefit of the doubt to the veteran in this case. If the doctor says: "Well, I don't know for sure but the illness of that veteran could have been caused by radiation", that is all I need; I will recommend very strongly—and I think the Hon. Member knows that a ministerial recommendation is quite a strong one—that that veteran be very seriously considered for a very generous pension.

I think that is the quickest way to get this matter dealt with. As soon as we get that kind of an indication, that recommendation will go forward. I assure the Hon. Member that that case will be heard very quickly indeed. I have great sympathy for people who could have contracted a serious illness due to carrying out their military duty in this way.

Clause agreed to.

On Clause 3—*When payments to cease*

Mr. Shields: Mr. Chairman, I, too, would like to compliment the Minister of Veterans Affairs on a very forward-looking and what could only be described as a very thoughtful piece of legislation. It not only recognizes the contributions of our veterans to the country, but it looks after them in the style in which they should be looked after.

I should like to ask two questions, if I may. First, how soon in the Minister's view will the backlog of pension applications be completed? I understand that there is quite a backlog awaiting decision. How long does the Minister feel, with this new legislation, it will take for them to be completed?

Mr. Hees: Mr. Chairman, I have great hopes that by the end of June—that is the target date which we set, as I have told my Department—these backlogs will be cut to an absolute minimum. I assure the Hon. Member and the Committee that the Department is working very hard and bringing in a number of innovations to speed up the processes and to cut out the loss of time which has been present in the past in dealing with these matters. We are working very hard at the present time. I have set that target date. They agree that it is a reasonable one. By the end of June these backlogs in all sections of the Department in these processes should be brought down to a very reasonable level. That is something which I check very carefully with the Department each time I go to Charlottetown. I am confident that very great progress will be made by that target date.

Mr. Shields: I have one further quick question. Having not been able to glean out of the Bill just exactly what I wanted to know, I should like to ask the Minister a very specific question. I have a constituent who is newly widowed but was never married to the veteran pensioner. In other words, they lived in a common law relationship. Will she be considered a widow in every sense of the word? Is that covered in the Bill, or is that left to the Minister's discretion?

Mr. Hees: That is left to my discretion, and it is my intention that people in such situations should be considered as having been married to the pensioners. I would consider them in the same category.

Mr. Foster: Mr. Chairman, I had hoped to ask my question when Clause 1 was before the Committee; however, I join with the official critic in congratulating the Minister of Veterans Affairs for bringing forward such an advanced, forward-looking Bill with so many benefits for veterans.

I was very impressed last November 8 when the economic statement was brought down. At that time I looked across the aisle and the only Minister smiling was the Minister of Veterans Affairs. He is to be congratulated on his ability to get money for veterans at a very difficult time, some $22 million, I understand.

Is any consideration being given to raising the amount of income which veterans can earn? I think there is a limit. I have received a number of representations indicating something like $940 per month. A number of veterans' associations have asked whether that limit could be raised to $1,500 per month. I think this would be under War Veterans Allowance Act benefits and associated regulations. Is the Minister giving any consideration to that? I wrote to him back in December on the issue. When putting through such an advanced and forward-looking Bill, not only providing the basic rate and improved benefits under the war veterans allowance, but a program to resolve the backlog of cases as well as the procedures of the Canadian Pension Commission, has any more consideration been given to the allowable limits that veterans can earn?

● (1250)

Mr. Hees: Mr. Chairman, I have certainly taken the Hon. Member's letter to me on this matter very seriously. It is something that in the future I would like to see accomplished. As the Hon. Member well knows, in order to do these things we must have the money. As he has pointed out very generously, the Department has been treated very well in that regard. When it is apparent that more money will be available, I can assure him that this question will receive active consideration.

Clause agreed to.

Clauses 4 to 12 inclusive agreed to.

On Clause 13—*Where split decision*

Mr. Gauthier: I would like the Minister to confirm on Clause 13 that, in the event of a split decision by the commissioners, the decision in favour of the veteran will prevail. Is my understanding correct?

Mr. Hees: Yes, Mr. Chairman, that is exactly how it will prevail. In making the move that has been made in this regard, that was one of the important considerations given to it. It will not only speed up the consideration process considerably, but it will make it possible without any shadow of a doubt that the benefit of the doubt always goes to the veteran. That is a key part of our new policy. In every case the pensioner must be given the benefit of the doubt.

In my talks with veterans' associations and Members of Parliament who represent pensioners when I took over the portfolio, I received the very definite impression from a great many of those who spoke to me that it appeared that those examining veterans' pension applications seemed to be trying to find ways of not giving the pension to the applicant. That has now been changed. We now look for every possible way that we can give the pension to the applicant.

I think we all agree that we are dealing with a very special group of people in this country today. Not only are they wonderful people because they are Canadians, but they all went overseas, took a chance at being killed, and a great many of them were. A great many came back badly wounded, maimed, unable to live the happy life that the rest of us are privileged to live. Therefore, I know that every Member of this House will want to do anything they can to make life more enjoyable for them. I know that all Members, because many have expressed the view to me, are in complete agreement with this policy.

While I am on my feet, I appreciate the fact that Members are allowing this Bill to pass very quickly. I want to congratulate those who have spoken this afternoon. In particular, I want to congratulate the official critics of the Liberal and New Democratic Parties this afternoon for their far too generous remarks about my efforts in this regard. They are much appreciated.

I have been in this House for 35 years. I have never seen a more generous reception given by the Members of the Opposition to a Government Bill than I have on this occasion. I can hardly believe my good luck. I am going to be on a cloud for quite a while. I just want to thank all Members for making that cloud possible.

Some Hon. Members: Hear, hear!

Mr. Gauthier: Mr. Chairman, I just want to add to the Minister's joy. As he knows, today is Valentine's Day and we thought he would enjoy having this.

Mr. Mantha: Mr. Chairman, I want to compliment the Minister of Veterans Affairs on his handling of the Bill and the passage of it. I also want to compliment the Minister on a case that I brought forward to him. This case has been around since 1976. The man in question is being operated on today. I want to thank the Minister of Veterans Affairs for his assistance and for allowing the pension.

Clause agreed to.

Clauses 14 to 16 inclusive agreed to.

Title agreed to.

Bill reported, read the third time and passed.

HIROSHI TERASHIMA, M.D.
INTERNAL MEDICINE

Diplomate American Board of Internal Medicine

411 - 30th Street, Suite 304
Oakland, California 94609
(415) 835-2744

October 22, 1984

Mr. Kenji Kuramoto
1109 Shell Gate Place
Alameda, California 94501

Dear Mr. Kuramoto:

The following medical illnesses are equivalent to what is listed as medical illnesses qualifying for government benefit for atomic bomb survivors: Japan

1. Anemia. Leukemia
2. Liver Function abnormalities (except viral or serum hepatitis
3. Cancer
4. Endocrine (hormone) abnormalities
   Example: Diabetes mellitus
5. Stroke, brain hemorrhage
6. Circulatory organ dysfunction
   Example: Hypertensive cardiovascular diseases, etc.
7. Kidney dysfunction
   Example: Chronic nephritis, nephrotic syndrome
8. Visual organ dysfunction
   Example: Cataract (except hereditary type)
9. Respiratory organ dysfunction
   Example: Lung tumor
10. Musculoskeletal system abnormalities
    Example: Deforming arthritis
11. Digestive system abnormalities from ulcer/inflammation
    Example: Stomach ulcer

Sincerely,

H. Terashima
Hiroshi Terashima, M.D.

HT:w

A-RESUME OF MEASURES FOR ATOMIC BOMB SURVIVORS

IN JAPAN

Ministry of Health and Welfare

August 1985

The Atomic Bomb Survivors Medical Treatment Law and subsequently the Atomic Bomb Survivors Special Measures Law were enacted in 1957 and 1963, respectively, for the purpose of promoting medical care and welfare measures for atomic bomb survivors exposed in Hiroshima and Nagasaki.

I. Atomic bomb survivors as defined by the law of 1957 are provided health handbooks. The number of these handbook holders as of 31 March 1985 is 367,344. These handbooks are issued by prefectural governors and the mayors of Hiroshima City and Nagasaki City upon application by atomic bomb survivors who conform to any of the following:

1. A person who at the time of the atomic bomb detonation was directly exposed within Hiroshima City or Nagasaki City or within a specified adjacent area of these cities or a person who at the time was in utero of a mother under the foregoing situation.

2. A person who entered within two weeks after the atomic bomb detonation a zone about two kilometers from the hypocenter of the atomic bomb or a person who at the time was in utero of a mother under the foregoing situation.

3. A person who engaged in relief of atomic bomb survivors or other activities to be physically affected by radiation or a person who at the time was in utero of a mother in the foregoing situation.

II. At present, the Japanese Government provides to health handbook holders the following: Medical care, allowances, and welfare measures. Funds are also provided for research and investigation related to atomic bomb survivors. The total budgetary outlay in the fiscal year (FY) of 1985, that is, from April 1985 to March 1986, is 429.0 million dollars computed at an exchange rate of 240 yen to one US dollar.

A. The budget for medical care to be provided this year in accordance with the Atomic Bomb Survivors Medical Treatment Law is 88.4 million dollars which is allocated as follows:

1. $500,000 for medical treatment of designated diseases. Cost of medical care involved in treatment of diseases attributable to atomic bomb radiation is borne in its entirety by the Government.

2. $81,600,000 for medical treatment of diseases in general. For treatment of diseases other than designated diseases, the Government bears that portion of the expenses not covered by health insurance. Consequently, atomic bomb survivors need not bear any expense involved in treatment of diseases in general.

3. $6,300,000 for health examination of atomic bomb survivors. Health examinations are available four times a year, i.e. regular examinations are provided twice a year and in addition two examinations are available at request.

B. In accordance with the Atomic Bomb Survivors Special Measures Law, various allowances as described below are provided to atomic bomb survivors with the amount for this fiscal year totalling 327.0 million dollars.

1. Special Medical Care Allowance: $450 per month will be payable to survivors who are suffering from diseases or injuries designated by the Minister of Health and Welfare to be attributable to atomic bomb radiation (2,014 cases in FY 1984).

2. Special Allowance: $166 per month will be payable to survivors who have been cured of their diseases or injuries designated by the Minister of Health and Welfare to be attributable to atomic bomb radiation (1,762 cases in FY 1984).

3. Atomic Bomb Microcephaly Allowance: $155 per month will be payable to survivors who have microcephaly due to atomic bomb radiation (24 cases in FY 1984).

4. Health Management Allowance: $110 per month will be payable to survivors who have any of eleven types of disorders including circulatory disturbances such as hypertensive heart disease, motor disturbances, visual disturbances such as cataract, hematopoietic disturbances, liver function disturbances, and endocrine disturbances (216,538 cases in FY 1984).

5. Health Allowance: $55 per month will be payable to survivors who were directly exposed within two kilometers from the hypocenter and those who at the time were in utero of mothers in the foregoing situation (25,788 cases in FY 1984)

Health Allowance: $110 per month will be payable to survivors of the foregoing category who are either physically handicapped of the 1st to 3rd grade as defined in the Physically Handicapped Persons Welfare Law or suffering with keloids or living alone without any kin and 70 years of age or more (2,096 cases in FY 1984).

6. Nursing Aid Allowance: $152 per month will be payable to survivors having mental or physical disturbances requiring the employment of a person for nursing aid (5,413 cases in FY 1984).

7. Family Aid Allowance: $47 per month will be payable to survivors having severe disturbances requiring the assistance of a non-paid person (21,733 cases in FY 1984).

8. Funeral Allowance: When an atomic bomb survivor dies, $471 will be payable to the person who holds the funeral (5,808 cases in FY 1984).

The Special Allowance, Health Management Allowance, Health Allowance, Nursing Aid Allowance, and Family Aid Allowance are not payable to those having a family member paying an annual income tax exceeding $3,382 or when the annual income of a family with two children and with one working parent exceeds $35,247.

C. As welfare measures, a total of 4.9 million dollars is made available as subsidies for the following:

1. Atomic Bomb Hospitals and Homes for Atomic Bomb Survivors

2. Home helper and consultation services for atomic bomb survivors

3. Atomic Bomb Memorial Ceremonies

D. For research and investigation of atomic bomb survivors, a budget of 8.7 million dollars is provided for the following:

1. Research program of Radiation Effects Research Foundation

2. Research and investigation of atomic bomb diseases

3. Survey on present status of atomic bomb survivors

Sept. 3, 1985

RADIATION EXPOSURE CLAIMS

		NUMBER	PERCENT
A.	Total Number of Cases in Study	5194	100.0%
	Cases with Diagnosis	3083	59.4%
	Cases no Diagnosis	2111	40.6%
B.	Cases with Diagnosis	3083	100.0%
	Allowed	79	2.6%
	Denied	3004	97.4%
C.	Total Cases in Study	5194	100.0%
	Claimed A-Test	3050	58.7%
	Claimed Other Exposure	2144	41.3%
D.	Those Who Claimed A-Test	3050	100.0%
*	Allowed	15	0.5%
	Denied	1871*	61.3%
	No Diagnosis	1164	38.2%
E.	Those Who Claimed Other Exposure	2144**	100.0%
	Allowed	64	3.0%
	Denied	1134	52.9%
	No Diagnosis	946	44.1%
IN SUMMARY			
	Total Cases	5194	100.0%
	Allowed	79	1.5%
	Denied	3005	57.9%
	No Diagnosis	2110	40.6%

* These 1871 claims have the following 1134 malignant diagnosis:

Histiocytic leukemia -	3	Blood condition -	5	Endocrine cancer -	34
Myelocytic leukemia -	29	Lymphocytic lymphoma -	37	Skin cancer -	159
Hairy cell leukemia -	7	Hodgkin's disease -	17	Brain tumor -	44
Unspecified leukemia-	38	Respiratory cancer -	288	Melanoma -	33
Lymphocytic leukemia-	31	G.U. Cancer -	145	Cancer, musculo-skeletal -	49
Myelogneous leukemia-	21	G.I. Cancer -	192	Misc sites	2

** These 2144 claims contain 825 Nagasaki and Hiroshima claims consisting of leukemia and other malignascies 364; Misc. 286 and exposure only 175. (None allowed.

$\frac{15}{3875}$ = 0.4% ALLOWED

3050
825
3875 TOTAL AV CLAIMS

NATIONAL ASSOCIATION OF
RADIATION SURVIVORS

TESTIMONY BEFORE THE SENATE VETERANS AFFAIRS COMMITTEE ON OVERSIGHT BY THE NATIONAL ASSOCIATION OF RADIATION SURVIVORS ON NOVEMBER 14, 1985 BEFORE:

HONORABLE SENATOR FRANK MURKOWSKI, COMMITTEE MEMBERS AND GUESTS

SUBJECT: VETERANS ADMINISTRATION REGULATIONS OF AUGUST 26, 1985 FOR ADJUDICATION OF CLAIMS BASED ON EXPOSURE TO DIOXIN OR IONIZING RADIATION

Our testimony on the Final Rules promulgated by the Veterans Administtration for adjudication of claims based on exposure to Dioxin or Ionizing Radiation will focus on the following issues:

1) The range of illnesses to be compensated;
2) The latency period for leukemias and that for other cancers indicated;
3) The use of radioepidemiological risk tables for V.A. claims adjudication;
4) The validity of the dose reconstructions provided by the Defense Nuclear Agency (DNA), and the inclusion of a "credible source" outside the DNA as a vehicle for accepted dose estimates;
5) Actual implementation of the regulations , especially sections dealing with "reasonable doubt" and "presumption".
6) Our urgent request that the Veterans Administration undertake a full program of notification to ALL atomic veteran claimants whose claims have been denied OR are pending, as well as the SCDD claims of surviving spouses/ offspring, noting the expanded range of compensatable illnesses.

I By way of introduction, NARS wishes to state that the expanded range of radiogenic cancers deemed compensatable, as well as the direction of the V.A. Advisory Committee to review the literature on posterior subcapsular cataracts and premature aging is welcome and long-overdue. Nevertheless, the list of illnesses has important omissions. The first is the exclusion of a number of cancers held by such authorities as the BEIR III (1980, National Academy of Science) report, which also included Lymphoma, Cancer of the Brain, Ovaries, Testes, Connective Tissue, Larynx, Parathyroid, and the Nasal Sinuses. More recent studies, too numerous to cite, come to the identical conclusion, NARS urges that these additional cancers be added.

Moving beyond the tumorous processes which radiation exposure engenders, the VA needs to consider the range of sclerotic and dyshormonal processes

I (concluded) which exposure to radiation may cause, as well as a series of aplastic or hypoplastic processes. Thus, diseases of a NON-TUMOROUS nature must be considered by the Advisory Committee. These include a list of illnesses which include: Sclerotic: arteriosclerosis, keloids, atherosclerosis, cataracts, dermatitis; Dyshormonal, including, thyroid inadequacy, hyperthyroidism, and so on; Aplastic illnesses as aplastic anemia, sterility; and so on. NARS suggests that the use of the list of diseases presently defined as radiogenic by the Government of Japan, and for which its exposed citizens are being compensated, be utilized by the Veterans Administration. This list is attached. NARS wishes to note that the preliminary results of their Medical/Genetic Questionnaire to the list of Atomic Veterans provided by the DNA shows an abnormally high incidence of sterility and cataracts among those responding to date.

II NARS finds the Latency periods chosen by the VA to be based upon recent medical research, and thus, acceptable.

III NARS wishes to note that the recent Radioepiemiological Risk Tables developed by Health and Human Services have been found by independent scientists to be seriously flawed. These Tables have NEVER been subject to peer review in a public hearing, and the Oversight Committee also criticized a number of the findings of the Tables. NARS urges that such a device as the present Tables NOT be utilized to detemine the probability of causation in a given cancer.

IV NARS was gratified to find that credible sources other than the DNA dose reconstructions would be acce pted by VA adjudicators, as we have invariably found that the DNA estimates, based as they are upon conjecture and computer simulations with inaccurate assumptions, to be absurdly low. NARS notes that a dose reconstruction by a qualified Health Physicist costs upwards of $500, a sum many unemployable, very ill atomic veterans cannot afford. This could render this assistance unobtainable.

V NARS continues to have questions with the actual adjudication of pending VA claims at local, regional, and BVA levels relating to the interpretation of "reasonable doubt" and "presum ption". At the very least, training in the intended use of these terms must be given in the field.

VI NARS earnestly requests that the VA undertake a full program of notification to all atomic veterans or their surviving family members who have had claims for SCDD/DIC benefits denied or which are pending oncerning the new regulations adopted on August 25, 1985. Only in this way can the fruits of these liberalized regulations be realized.

Thank you for your attention. Keason F. Warcheme

PRESIDENT, NARS

原爆被爆者に対する援護のお知らせ（見やすい所にお貼り下さい）

被爆者の諸手当が、次のように改正されます。

手当の種別	支給金額	病気の種類	支給条件	所得税額による制限
医療特別手当	月額　104,400円	原爆の傷害作用によるものと厚生大臣の認定をうけた者（認定患者）で、現在もその負傷または疾病の状態にある人	認定被爆者	な　し
特別手当	月額　38,400円	厚生大臣の認定をうけた人で現在はその負傷または疾病の状態にない人（治ゆした人）		年間所得税額が 792,300円以下の人
健康管理手当	月額　25,600円	1．造血機能障害（貧血症・白血病など） 2．肝臓機能障害（血清肝炎・ビールス性肝炎を除く） 3．細胞増殖機能障害（悪性新生物など） 4．内分泌腺機能障害（糖尿病など） 5．脳血管障害（脳出血など） 6．循環器機能障害（高血圧性心疾患・慢性虚血性心疾患など） 7．腎臓機能障害（慢性腎炎・ネフローゼなど） 8．視機能障害（白内障）先天性を除く 9．呼吸器機能障害（肺気腫など） 10．運動器機能障害（変形性関節症など） 11．潰瘍による消化器機能障害（胃潰瘍など）	左の病気のある人	同一世帯のうち直系血族の一人の年間所得税額が 792,300円以下の人
保健手当	月額　12,800円	制限なし	2km以内で直接被爆した者（医療特別・特別・健管手当との併給はできない）	上に同じ
	月額　25,600円	70才以上の孤老，厚生大臣が定める程度の身体上の障害・ケロイドのある人		
介護手当	月　35,800円以内	厚生大臣が定める障害等のため，医師が介護の必要を認め，介護料を支払っている人	介護日数より	上に同じ
家族介護手当	月額　10,800円	厚生大臣が定める障害等のため，医師が介護の必要を認め，家族介護をうけている人	制限なし	
葬祭料	一時金105,000円	被爆者が死亡した場合	交通事故・喧嘩などで死亡した場合は除く	な　し
小頭症患者	月額　35,800円		小頭症と認定された人	な　し

◎ 左記の表の金額は昭和五十九年六月分から支給されます。
所得制限は昭和五十九年六月分から実施（五月中に税額届を提出して下さい。）

○ 諸手当申請手続、その他被爆者の相談ごとは ⇩

広島市中区大手町四丁目五番六号
㈶ 原爆被爆者福祉センター

○ ●舟入病院（人間ドック）　●山口市湯田荘
●別府原爆センター　●長崎（大和荘）　の利用申込は⇩
[illegible]

広島平和会館
電話 [illegible]（五四一）七二二六番

HIROSHI TERASHIMA, M.D.
INTERNAL MEDICINE

Diplomate American Board of Internal Medicine

411 - 30th Street, Suite 304
Oakland, California 94609
(415) 835-2744

October 22, 1984

Mr. Kenji Kuramoto
1109 Shell Gate Place
Alameda, California 94501

Dear Mr. Kuramoto:

The following medical illnesses are equivalent to what is listed as medical illnesses qualifying for government benefit for atomic bomb survivors: Japan

1. Anemia. Leukemia
2. Liver Function abnormalities (except viral or serum hepatitis
3. Cancer
4. Endocrine (hormone) abnormalities
   Example: Diabetes mellitus
5. Stroke, brain hemorrhage
6. Circulatory organ dysfunction
   Example: Hypertensive cardiovascular diseases, etc.
7. Kidney dysfunction
   Example: Chronic nephritis, nephrotic syndrome
8. Visual organ dysfunction
   Example: Cataract (except hereditary type)
9. Respiratory organ dysfunction
   Example: Lung tumor
10. Musculoskeletal system abnormalities
    Example: Deforming arthritis
11. Digestive system abnormalities from ulcer/inflammation
    Example: Stomach ulcer

Sincerely,

H. Terashima
Hiroshi Terashima, M.D.

HT:w

Senator MATSUNAGA. Ms. Fond, I am already 10 minutes late for my next appointment. Could you limit your testimony to 5 minutes?

Ms. FOND. I can try. It is not really that long, and I can go to the point.

Senator MATSUNAGA. Thank you.

STATEMENT OF FELICE FOND, MEMBER, NATIONAL ASSOCIATION OF RADIATION SURVIVORS

Ms. FOND. Good afternoon.

I would like to thank Senator Murkowski's office and all who are involved for having this hearing today, and I am glad you are here, Senator.

I would like to pass around a picture of my father, if somebody could—when he was in the U.S. Army.

My father, Herbert Sydney Fond, served in the U.S. Army from November 17, 1952 to November 16, 1954. From March through June in 1953 he was sent to Camp Desert Rock, NV, to take part in the Atomic Weapons Testing Program.

He participated in several shots, including shots Badger, Simon, Encore, Harry and Greybill of Operation Upshot Knothole.

He also participated in an event in which an artillery piece fired an atomic warhead.

In 1980, my father wrote the following letter to Stewart Udall:

> Dear Mr. Udall:
>
> I was in the Army between 1952 and 1954, some of which time was spent at Camp Desert Rock, Nevada, wherein I participated in several shots, some of which were the use of atomic weapons in tactical warfare.
>
> In these exercises, the bomb went off. After the dust cleared, we went directly into ground zero area. Afterwards, we had badges on, had red badges to measure exposure, and we were assured we were OK.
>
> I don't recall the date at the Desert Rock, but my Army records would verify this. However, I approximate March through June 1953.
>
> I have suffered from malignant lymphoma for the past 10 years. I have never called the VA.
>
> Please advise.
>
> Sincerely, Herbert Sydney Fond.

On February 2, 1982, my father died of leukemia. He was only 51 years old. My father was ill for 13 years. My family and I witnessed the demise of a beautiful man, brilliant, successful, kind, sensitive, giving.

I watched him shrivel into nothing, a man 51 suddenly looked 80 years old. We held his hand in the hospital during his brain seizures, and stroked his head and assured him that it would be over very soon.

He was not a man who complained very much. He talked very little about what happened at Camp Desert Rock in 1953. What he did say struck me like a dagger. Very few words, so much meaning, and so incredibly powerful.

My dad was too busy fighting for his life, and his death was taking a very heavy toll on my family. He left a young widow, 42 years old and four children—two in high school and two in college. Our grief has run deep, to say the least.

My mother has attempted to make a new life for herself, but still continues to feel my father's loss quite profoundly. She still cries a lot, and often contemplates taking her own life in order to stop the pain. At times, it just becomes too overwhelming.

This country has turned its back on her beloved husband and continues to turn its back even after he is dead and buried.

My brother was only 16 when he lost my father, but he is still feeling the effects quite deeply. My beautiful family, as well as several other families, are here today. Between my sisters, brother and me, they have traveled thousands of miles to show you just how concerned they are about an issue which has caused not only serious illnesses and death, but much mental anguish and pain.

If my family would just stand for a moment so you could see them, I would appreciate it—all members, wherever you are.

Thank you.

Radiation victims have been called "the forgotten guinea pigs." And, indeed, this is accurate. It is evident from the appalling statistics and various documentations that over a million persons, including civilians and military men, were unknowingly exposed to levels of radiation, which after a certain latency period caused them to suffer an illness and/or death.

I remember the NAV chapter I belonged to at the Vietnam Vet Center in Oakland, CA, in 1982. I developed many wonderful friendships. Most of those men whom I grew to love and respect have died—they are dropping off like flies.

Four years—or should I say, 40 years later—this issue is still heartbreaking. It is to my understanding that it took Senator Warner approximately 4½ minutes to review and pass his bill.

How can anyone be so callous? This issue has affected men and women of every creed, color, and ethnic background, be it black or white, Christian or Jew.

The continuing theme and stand of the U.S. Government has insisted upon taking is one of "Prove it."

The U.S. Government's theme is "Prove it," prove to us that you were exposed to a dangering level of radiation; prove to us that this radiation has caused your serious illness and/or death.

Furthermore, prove to us that you were even there.

I didn't know about this until the last several years, and yet you have your proof. Over 1 million people were affected. Many are dead. To my knowledge, those who are living are not in good health.

What does this mean?

It means that the proof is in the pudding.

Sometimes we see what we want to see, hear what we want to hear. This can no longer be ignored. The fire which was apparently considered arson, which was set in St. Louis, MO, in order to destroy military personnel records, leaves much room for heavy suspicion.

What happend to those records anyway? Specifically, the cemetery records, which measured the amount of radiation on each individual.

By the way, those readings were all terribly inaccurate. This is a scandal; a serious crime has been committed with gross implications.

The Reagan-Gorbachev Summit could not have come at a better time, because we are evidence and proof and statistics of what a nuclear war, Star War, will create and beyond.

Dr. Danielle Wardman said at the NARS convention at Portland, ME, this fall:

"You are the first victims of World War III."

And yet we are the last to be heard. Why? How outrageous! Look at what has happened.

I understand now that there are low levels of radiation leaking out of nuclear plants across the country, if not the world.

As David Bradlee said in his book, and it is also appropriate—the title: "No Place to Hide"—it is true; there is nowhere else to go.

The choice between continued civilization or annihilation by nuclear war. If I get up and start dancing the polka, eventually everyone may be dancing the polka. Of course, there may be a few who elect not to do so, but at least I will have enjoyed my last dance knowing that I made the right choice.

I know this is supposed to be a hearing on atomic veterans exclusively, but don't you see, it all ties in to one another.

Nuclear is nuclear. Atomic is nuclear, and nuclear is atomic.

We have to get rid of these bombs; they are no good. We must find a way. We must help those whom we have wronged. We must own up to our mistakes. We all make mistakes.

And just for the record, let it be known that the Canadian and Japanese Governments have taken much better care of their radiation victims than the United States.

Look at the effects of nuclear radiation. It is sickening. To form on the—cancers of several sorts, babies born with very serious genital defects and large heads, and what about those children born with birth defects?

I do not know if this is related to my father's exposure or not, but I have a typical lymphocytes, and 2 years ago, I was tested for leukemia. I also have some other health problems.

Some studies have been done which indicate that many of the children have developed the allergy problems and very serious other problems in their midtwenties.

Pat Gosler, please stand—the daughter of an atomic veteran who is here today, has narcolepsy, a sleeping disorder, and has had several tumors removed.

Both of her children were born with birth defects.

Kate Engle's daughter, who was not able to come today, was born without a hand.

A boy I knew in Oakland, CA, son of an atomic vet was born without testicles.

It goes on and on and on and on and on. We do not know what the future holds in store for us. Some of us are afraid to have children. Radiation poisoning does not go away. It is like gum stuck to the bottom of your shoe—rocks and molds will eventually fade into the woodwork, but it never goes away.

Gene Farr, an atomic veteran, is too ill to come here today, but asked me to convey this to you.

> I am continually sore, muscles, bones—one of each sometimes; both sometimes; have to fall out of bed sometimes; can barely get to the bathroom. I have been com-

plaining about it to the VA doctors for all this time, numerous doctors until I demanded to see one doctor continually.

I have taken several different medications, and I must take it the rest of my life. I experienced two accidents in the South Pacific, and one at Okinawa.

My buddy and I—we walked Hiroshima together. He died 5 years after the war. His records are documented. I have them. I would like to submit this as proof, the proof factor. Mine are missing. I am still alive.

Submit this please.[1]

But it is in very bad shape.

I will conclude. I am here today because I am supposed to talk about my father. I am supposed to give you a sense of what happened to him during those difficult years. I am supposed to give you the human side of this story—human? What is human? Define human. Those like my father—remember that, because they were there, because they served our country, because they cared, because they had no concept of what was being done to them, because they worked and they worked—because they were human.

Those men and women were patriots, by serving the U.S. military or working for the Government, they were serving their country. They showed the kind of devotion that we as Americans pride ourselves in, but the U.S. Government turned a blind eye and a deaf ear to them.

I am here today because you are my only hope. I nor a million others cannot take our cases to court; you are our only recourse. You cannot bring back my father, other servicemen, or civilians; you cannot rewrite this dream.

I appeal to you as Senators, you can rewrite the law. I urge you to help the U.S. Government to take responsibility for a terrible mistake. I appeal to you to legislate justice and we have an important document, which must be addressed. I urge you to call Langdon Harrison at this time, about the article that was in the Washington Post this morning.

Thank you for your kind attention.

Senator **Matsunaga**. Thank you, Ms. Fond.

[The prepared statement of Ms. Fond and other material follow:]

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[1] See p. 203.

PREPARED STATEMENT OF FELICE FOND

My father, Herbert Sydney Fond served in the U.S. Army from November 17, 1952 through November 16, 1954. From March through June of 1953, he was sent to Camp Desert Rock in Nevada to take part in the "Atomic Weapons Testing Program". He participated in several "shots" which used atomic weapons in tactical warfare. Approximately fifteen years after these shots, he was diagnosed as having "malignant" Lymphoma. At the time, my father was fortunate enough to be admitted to a special experimental treatment program for cancer patients at the University of Southern California. During this time, approximately 1968-69 my father's Oncologist, Dr. Lowell Irwin began probing for any unusual events in my father's medical history. He was looking for possible causes of the Cancer. He pointedly asked my father if he had ever had any contact or been exposed to any form of radiation. In response, my father began to make inquiries about the possibility of his exposure to endangering levels of radiation and in 1980 he wrote the following letter to Stuart Udall: (Please refer to page marked letter).

I recall a conversation I had with my father prior to his death. I asked him why he never inquired as to whether the shots were exposing him to potentially dangerous-lethal levels of radiation. He responded by saying, "Once, after finishing a "shot"-and going into the showers - as I was peeling off my clothing for immediate disposal and was about to get vacuumed off, I remember asking the guy who was taking my clothing if this stuff was dangerous and exactly how much radiation we were being exposed to. He told me not to worry because the amount of radiation was minimal. He said, "about as much as you'd get in a dentist's office, you know- x-rays"." On February 2, 1982 my father died of malignant Lymphoma and it wasn't due to dental x-rays!

My Dad's death has taken a very heavy toll on my family. He left a young widow, forty-two years old and four children; two in high school and two in college. Our grief has run deep to say the least. It seems that ever since his death our lives have been put on hold. It is only now that we are beginning to pick up the pieces ....almost four years later. I recall attending meetings at the Vietnam Veteran's Center in Oakland, California six weeks after my father's death. I went there because meetings were being held for the National Association of Radiation Survivors-- and I wanted to be with people who I felt would better understand my situation. As it turned out I met many wonderful people, several of whom were ill with Cancer just like my father and some of whom had been at Camp Desert Rock just like my father. But, I remember one man in particular. He was very glad to see me because children of the Atomic Vets very rarely came to the meetings. He wanted me to meet his son, but he felt he had to warn me that his son had been seriously deformed at birth; a misfortune he attributed to his own exposure to radiation.

Atomic Veterans have been called the "Forgotten Guinea Pigs" and indeed this is accurate. It is evident from the appelling statistics and various documentations that 250,000 civilians and military men were unknowingly exposed to levels of radiation which, after a latency period between 12 to 15 years caused them suffering, illness, and/or death. A mistake was made; a very big mistake. But a mistake is a mistake and when you or I make a mistake, what do we do? We either apologise or compensate for what we've done wrong or both, but to forget about it-to wipe it off the map as though it had never happened is just making another mistake. We can't forget these "Guinea Pigs"- for they were someone's father, brother, or son.

My father was ill for thirteen years. My family and I witnessed the demise of a beautiful man; brilliant, successful, kind, sensitive, giving. I watched him shrivel into nothingness. A man of 51 suddenly looked 80 years old. I held his hand in the hospital during his brain seizures, stroked his head, and assured him that it would be over very soon. He was not a man who complained very much. He talked very little about what happened at Camp Desert Rock in 1953, but what he did say about it struck me like a dagger - very few words with so much meaning and so incredibly powerful.. My dad was too busy fighting for his life. He fought for thirteen long years and the battle just became too great in the end. I came here today because I'm supposed to talk about my father. I'm supposed to give you a sense of what happened to him during those difficult years. I'm supposed to give you the human side of this story. Human? What is Human? Define Human; those Guinea-Pigs, like my father....REMEMBER them; because they were there; because they served our country; because they cared; because they had no concept of what was being done to them; because they were who they were; because they were human. These men were patriots. By serving in the U.S. military, they were serving their country. They showed the kind of devotion that we as Americans pride ourselves in, but the U.S. government has turned a blind eye and a deaf ear to them. I am here today because you are my only hope. I and 250,000 other patriots cannot take our cases to court;.you are our only recourse*. You cannot bring my father back to life. You cannot re-write history. I appeal to you as Congressmen...........you can re-write the LAW. I urge you to help the U.S. government take responsibility for a terrible mistake. I appeal to you to legislate justice.

Thank you for your attention.

Sincerely,

Felice Ford

Felice Ford

---

* My own case for wrongful death was dismissed recently as a result of the Warner Amendment.

Regional Office

Anthony J. Celebrezze
Federal Building
1240 East Ninth Street
Cleveland, OH 44199

Veterans Administration

SWORN AFFIDAVITS
MAILED TO D.C.

May 20, 1981

Mr. Eugene A. Gordon
208 Wayne Avenue
Youngstown, OH 44502

Dear Mr. Gordon:

We have carefully considered your claim for service-connection for a head injury and for residuals due to exposure to radiation, based on all the evidence of record including your service medical records and the statement that you submitted.

The new evidence you have submitted for your claim for exposure to radiation does not present any evidence that you have any residual effects of such exposure. Accordingly, your claim for service-connection for this condition is again denied. In addition, there is no evidence in your service medical records of any head injury. Your claimed head injury was first discovered in May of 1981. Accordingly, service-connection for this condition is denied. We are sorry we are unable to make a more favorable decision.

Sincerely yours,

B. WEISBERG
Adjudication Officer

Enclosure
1-4107

SHIPMATE JACK LYNCH'S
MEDICAL RECORDS FOUND - MINE
STILL LOST - HEAD INJURY, UN-
CONCIOUS 72 HRS OR MORE
SPINE INJURY, BONE CHIPS RE-
MOVED - OUT FOR ? DAYS.
(AT SEA) OUTSIDE OKINAWA

AFTER TELLING @ DOCTOR I SAW AT VA HOSPITALS FOR
YEARS - 84 1981 (DATE OF THIS DENIAL) THEY TOOK BRAIN SCAN: FOUND SCAR
LONGER THAN EYEBROW ON LEFT SIDE - EEG PROVED TEMPORAL LOBE — (L) IN
1985

In Reply Refer To: C 10 326 885 GORDON, Eugene A.

Form Approved
OMB No. 76-R0331

VETERANS ADMINISTRATION

STATEMENT IN SUPPORT OF CLAIM

SOCIAL SECURITY NO.
448-24-2609

VA FILE NO.
c- 22374597

PRIVACY ACT INFORMATION: The information furnished on this form is authorized by existing law (38 U.S.C. 210 (C)(1)) and is considered relevant and necessary to determine entitlement to maximum benefits applied for under the law. The information submitted may be disclosed outside the Veterans Administration only as permitted by law.

FIRST NAME - MIDDLE NAME - LAST NAME OF VETERAN (Type or print)
BOBBIE R. DRIGGS

The following statement is made in connection with a claim for benefits in the case of the above-named veteran:

While on Active Duty at Camp Desert Rock, Nevada, I participated in an Atomic Blast, Code-name: Shot"ANNIE"of The Upshot-Knothole Series, 17 March,1953. I was Sgt. in Co."B", 412th Engineers Const. Battalion. I was stationed at Camp Desert Rock, Nevada during the entire Series, From 17 Jan.,1953 til 29 July,1953. I WAS wearing a Film-Badge at the time of the Shot. My Radiation Dosage was SO HIGH, I had to shower, Clothing & all, FOUR times. My Film-badge was taken from me at Camp Mercury, developed & read there, Also, where I showered FOUR times. I was, later, informed I could NOT return to "THE AREA" again because I had had all the Radiation I could tolerate. ALL of the "HOT" metal on my person, at the time of the Blast; Dog-tags, metal fatigue buttons, the NAILS in my boots, belt buckle, & helmet, I wore until my discharge, 2 August,1953. I was with a group of, approximately, 50 other men in a trench 1 mile from the Blast. I REPEAT!!; I was Sgt. of a squad of twelve men. As soon as the "Shock-wave returned,-We were picked up by A Helicopter,(Which we had been practicing this Maneuver for a week.) Taken to Ground Zero, we jumped from the hovering 'Copter, walked around the concrete TOWER site, until we were joined by the other men that had been in the trench with us,(The hightest ranking officer was a young Lieutenant) we ALL walked around approximately 5 minutes more, Then walked back to the trenches where the trucks were wai[illegible]

I CERTIFY THAT the foregoing statements are true and correct to the best of my knowledge and belief.

DATE SIGNED
1 June 1984

SIGNATURE
Bobbie R. Driggs

ADDRESS
Route-# 1, Box # 144, Van Buren, Mo. 63965 Ph.(314) 323-8521

PENALTY - The law provides severe penalties which include fine or imprisonment, or both, for the willful submission of any statement or evidence of a material fact, knowing it to be false.

VA FORM FEB 1979 21-4138 EXISTING STOCKS OF VA FORM 21-4138, JUL 1977, WILL BE USED. ☆U.S. GOVERNMENT PRINTING OFFICE 1983 381-469/2869

Form H-8
(1940)

Page [illegible]

MEDICAL HISTORY

[illegible]
(surname)

[illegible]
(Christian name)

Born: Place [illegible] Date [illegible]

STATE NAME OF PLACE   DATE EACH NEW ENTRY

T [illegible]

O VULCAN (AR5) for treatment and diagnosis.

H L Hood
H.L. HOOD
HM1c USN

USS VULCAN (AR5)
FT26 November 1945.
Diag.: Enteritis, Acute. #322
DN EPTE. Not misconduct.
P.F. Appears flushed and toxic.
Generalized abdominal tenderness.
Appears dehydrated.
RX: Bed. Sulfadiazine routine.
KAOMagMa ½ ounce Q4h.
1000 cc intravenous saline.
11-29-45. Two stools today somewhat watery. Feels much better.
11-30-45. Much improved.
D 12-1-45. No complaints. Feels fine
5 Discharged to duty.

Henry H Blyth
HENRY H. BLYTH,
COMDR.(MC)USNR.

USS. YMS 461   3-28-46
Examined this date and found physically qualified for transfer
R.J. Kristein PhM3/c

Name LYNCH, Jack Harrington
(Name in Full, Surname to the Left)

879 18 97 Rate MoMM3c
(Service No.)

Date Reported Aboard: 11 March 1944

U.S.S. YMS 461
(Present Ship or Station)

RS, SO Annex, NOB, Norfolk Va.
(Ship or Station Received From)

Authorized to wear Asiatic-Pacific Campaign Medal. Ref.: ALNAV 104-44.

Authorized to wear American Theater Campaign Medal. Ref.: ALNAV 104-44.

Authorized to wear World War II Victory Medal. Ref.: ALNAV 353-45.

Took part in Okinawa Operations, thi vessel operating at Okinawa between 24 March & 30 June 1945.

Took part in "Juneau" Minesweeping Operations off China Coast from 22 July to 31 July 1945. Entitled to wear Operation and Engagement Star. Auth.: AdCominPac Confid Ltr. P15, Serial No. 02535.

Entered Tokyo Bay, 28 August 1945, with first initial Occupational Naval Force under ComTaskForce THIRTY-ONE.

Date Transferred J. B. ROBINSON,
Lt(jg) USNR.

To

(Signature and Rank of Officer Authorized to Sign)

Date Received Aboard:

(Name of Ship or Station)

(Ship or Station)

(Signature and Rank of Officer Authorized to Sign)

TRIPLICATE

FORWARD TO BuPers [illegible] DIRECTLY UPON TRANSFER

Senator MATSUNAGA. Thank you very much—all of you. I wish we had——

Dr. LEGARRETA. It is very important.

Senator MATSUNAGA. Let's see, how many statements do we have here?

Mr. GUTTMAN. Senator.

Ms. FOND. We have the document from EPI, and the Redwing report we want introduced into the record of this hearing.

Senator MATSUNAGA. Without objections the statements will be included in the record.[1]

And I wish to announce at this time that any of you who wish to submit additional statements in writing may do so in the next 7 days.

And if there be any among you in the audience who would like to submit written statements for the record, you may also do so.

And I regret very much that the force of work in the Senate has been such that we have had to work late last night, and we have been working as late as 3:30 in the morning; and we worked Saturday, Sunday, Monday—until 3:30 a.m., Tuesday, a week ago; and so I hope you will excuse the absence of my colleagues here; they are required to be at so many different places, all at the same time. We need three full bodies really to do the work of a Senator.

But I might close the meeting with this advice, that you must come to your Senators and Representatives with your story, but not only at committee meetings such as this, but individually. Get appointments with your Congressmen, with your Senators, and tell your story, because—well, I will relate my own experience.

When I was a student at Harvard Law School, I was asked to come to Washington by our then Delegate to Washington, Joe Farrington. Hawaii was trying for years to become a State of the Union, without success, and one of the biggest holdups in the Senate was the Southern bloc opposition, Senator Russell Long being the leader of that bloc. Our Delegate to Congress at that time, being a Republican, could not get to the Senator.

So, he called me at the law school, and asked that I come down and talk to Senator Long; I said, "Heavens, I have an exam coming up in 2 days."

He said, "Well, this is more important."

So, I did come down. And when I went to Senator Long's office and asked for an appointment, his secretary said, "Sorry, he's solidly booked."

I said, "Well, will you do me this favor: Tell him that I am a veteran of the 100th Infantry Battalion, 442d Regimental Combat Team," knowing that he had plenty of aloha for veterans of that regiment.

And she went in, came out, and said, "Five minutes."

And so I went into his office, and Senator Long gave me more than one-half hour, listened to me, very courteously, attentively; and after what I thought was the most persuasive spiel that I could have made, he turned to me and said, "Young man"—and I am a year older than he is—[Laughter.] "You all must remember that a

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[1] See pp. 250 and 280.

U.S. Senator is primarily interested in two things: One, to be elected; two, to be reelected." [Laughter.]

He said, "Don't come to me; go to my constituents. If my constituents tell me that I should support Hawaiian statehood, I will."

So, I took his advice. I did go to one of his constituents, a very important one, the chairman of his fundraising committee, and I found out that it was a good friend of mine, George Lelightner. I called him down in New Orleans, and I told him, "George, we need your help. We have got to get Russell on our side."

And he said:

> Well, I tell you what you do, Sparky, you invite Russell to go to Hawaii; get the Governor to invite him; get the Chairman of the Democratic State Committee to invite him.

And so we did. We got him out to Hawaii. We showed him what Hawaii was like, and much to his credit, he wasn't interested in tourist sites. He went out into the plantations, sugar plantations, the mills and the fields, and the pineapple canneries, and came back fully convinced that Hawaii was ready for statehood; and when he converted from opposition to pro-statehood, he brought the entire Southern bloc with him.

And that's how Hawaii won statehood. The Hawaii statehood bill was approved by the Senate before the House approved it.

So, what I am trying to say here is that you have got to get to your own Senators, your own Congressmen, from your own State and your own district; and there you will get results. In my case, being a life member of the DAV, I have great sympathy for veterans, those who served in military service of our country. They have paid their dues, yes.

And what they are asking is not charity but what is due.

Well, we have sympathy, and most of the members of this committee have sympathy for veterans. But we are such a small group here. You have got to win the majority over to your side, both in the House and in the Senate. You have got to do that—and that is the advice we will leave with you. And believe you me, unless you do that, you are not going to attain the goal to which you are dedicated.

Dr. **LEGARRETA**. So, you are saying, Senator, when there is a clear, moral wrong that our country has done to its men and women, that we have to induce our Representatives to see it?

Senator **MATSUNAGA**. Yes; you have got to.

What else?

You know, I introduced a bill in the House of Representatives when I was first elected, in 1962, to establish the U.S. Academy of Peace. I was dedicated to see that my sons, my grandsons will not have to fight in another war.

Do you know how long it took me to get that bill passed?

Dr. **LEGARRETA**. I know how long it took you—OK.

Senator **MATSUNAGA**. 21 years, my friend.

But don't give up.

Dr. **LEGARRETA**. We are not.

Thank you, Senator.

Senator **MATSUNAGA**. The committee stands in recess, subject to the call of the Chair.

[Whereupon, at 12:55 p.m., the hearing was adjourned.]
[Additional material supplied for the record follows:]

THE WASHINGTON POST

A8 THURSDAY, OCTOBER 3, 1985

Bomb Testing Victims Seek Right to Sue U.S.

Atomic Veterans Fight Warner Amendment

By Sandra Sugawara
Washington Post Staff Writer

On the morning of March 22, 1955, James A. Dennis of Alexandria crouched in the chill Nevada desert, 3,500 yards from where an atomic bomb exploded with a blinding flash.

Dennis, who was an Army major at the time, said yesterday he and the 300 soldiers he commanded soon were covered with sooty, radioactive fallout. The next day Dennis was back in the desert at another atomic bomb test explosion and in 1962, he was directed to dismantle and dispose of a highly radioactive nuclear reactor that accidentally exploded the year before, killing three military personnel.

"Now I'm dying of blood and bone marrow cancer," said Dennis, who served in the Army 21 years, retiring as a colonel.

JAMES A. DENNIS
. . . "I'm dying of cancer"

Dennis was one of several military veterans who appealed yesterday to a House Judiciary Subcommittee for legislation to allow them to sue the government for injuries they said they are suffering as a result of being exposed to atomic bomb testing in the 1950s.

Their suits are effectively blocked by the so-called Warner amendment to the 1985 Defense Appropriations Act and a doctrine that prohibits military personnel from suing the government for injuries sustained on active duty.

The amendment, little-noticed when offered last year by Sen. John W. Warner (R-Va.), has been under virulent attack by veterans who say they have been made ill by forced exposure to radioactive fallout.

The Warner provision protects federal contractors from claims for injuries arising out of atomic weapons testing programs. It states that the federal government should be substituted for the private contractor as the defendent in those cases.

But a Supreme Court ruling, known as the Feres Doctrine, states that the Federal Tort Claim Act does not extend to injuries to servicemen that arise out of the course of service.

"Accordingly the Warner amendment and the Feres Doctrine operate as a complete bar to suits by atomic veterans injured by the negligence of federal contractors during those tests," said Alvin M. Guttman, counsel to the National Association of Atomic Veterans. Congress, he said, has "denied the atomic veterans rights to pursue any claims in the U.S. courts whatsoever."

Warner said yesterday in an interview that he offered the amendment at the request of the Reagan administration. "No one brought to my attention this special category of tragic victim," he said.

Rep. Frederick C. Boucher (D-Va.) has introduced a bill that would give such veterans the right to sue the United States. The bill "neither eases their burden or proof nor does it address other legal-obstacles which must be overcome in such litigation," said Boucher. "It does say to those who may have been injured in the service of their country that Congress made a mistake last year, a mistake that we are going to correct."

Warner met yesterday with Dennis and other atomic veterans and said afterward that he was "distressed by their rendition of their personal tragedies." However, he did not agree yesterday to endorse the Boucher bill or work to repeal his provision, as the veterans requested.

There are 250,000 servicemen who participated in 235 tests carried out between 1946 and 1962. More than 99 percent of the claims have been denied, according to Guttman.

A2 Thursday, July 18, 1985 ... The Washington Post

MARY McGRORY

Help Our First Atomic Victims

That first test, 40 years ago in New Mexico, has been described poetically by the inventors of the nuclear bomb, some of whom are sorry now. Subsequent tests, on Pacific islands and in American deserts, evoked no poetry, but some bewildered servicemen have lived with the consequences ever since.

Representatives of two Trinity alumni groups were on Capitol Hill for the anniversary of Trinity, as the first explosion was named by J. Robert Oppenheimer. Trinity scientists Victor Weisskopf, Robert Bacher, Hans Bethe, Philip Morrison and Cyril Smith held, under the auspices of the Union of Concerned Scientists, a somber seminar in the Senate auditorium, during which they pleaded for a reduction of a stockpile to which they made the first fateful contribution.

At the same time, a House Veterans Affairs subcommittee listened to the pathetic testimony of atomic veterans, those good soliders and sailors who marched or sailed into the heart of the fallout caused by the 235 tests carried out during the halcyon days when scientists unaccountably failed to warn the authorities of radiation hazards.

The atomic veterans, who cheerfully scrubbed the decks of vessels used in the tests or played in radioactive waters, certainly did not know. One of them, Robert Farmer, then a 19-year-old seaman, stepped ashore on Bikini Island hours after two 23-kiloton bombs had been exploded. After eight of his nine children were born with serious genetic defects, he began to make the connection.

Farmer suffered from cancer of the thyroid and heart problems. The Veterans Administration, which hates to consider ills imposed on servicemen by their own side, had no time for him. He got the treatment later accorded to Vietnam veterans zapped by Agent Orange. Finally, Farmer went to then-Rep. Paul Simon (D-Ill.), a man with an acute sense of justice. Now a senator, Simon has drafted a bill that clearly establishes the government's responsibility to the forgotten victims.

To the unexpectedly sympathetic subcommittee, Simon explained his proposal for relief for atomic veterans. To begin with, he wants to have their radiation-related ailments treated as service-connected disorders. In the long run, Simon calls for the establishment of a program of research and training for servicemen exposed to radiation.

The Reagan administration is flatly opposed to the Simon solution. VA General Counsel Donald L. Ivers denounced it as a wicked extravagance. He claimed the cost would be an alarming $23 billion. He arrived at this figure by including all atomic-era veterans in the possible clientele.

Simon says he is concerned only with the 250,000 servicemen who participated in the 235 tests so blithely carried out by the authorities between 1946 and 1962, before the Kennedy test ban.

Presently, the burden of proof that an illness, often long years after exposure, is caused by radiation is on the veteran. Records of participation are apparently sketchy. For instance, Ford Harrison, a 71-year-old Navy veteran from Selma, Ala., testified that he was part of a landing force at Nagasaki 33 days after the second of two explosions that ushered in the era of nuclear weaponry. He stayed there two weeks. Five months later, his teeth fell out. Since then, he has suffered from lung cancer and skin cancer. The Veterans Administration denied his claims because they said he could not prove he was in Nagasaki. But he could, with pictures.

Simon pointed out while the administration is fighting him on relief for atomic veterans, the Department of Defense is pushing a bill that contains a trust fund for claims of victims of low-level radiation in the Marshall Islands, where many of the 66 South Pacific tests were conducted.

The stricken scientists who are now pleading for the lives of potential nuclear casualties might do well to lend an expert hand to these actual, unintended victims of their genius. The lack of information that led the services to expose 250,000 uniformed Americans to radiation still afflicts the atomic veterans, who are expected by their government to provide "scientific" evidence that radiation is the cause of their woes. Who could help them better than the scientists, whose ignorance—or indifference—informed the 20-year orgy of testing?

No one wants to add to the regret and guilt of these distinguished scientists, who were looking for a weapon to end World War II and found one that could end the planet. But they are plainly seeking atonement. The atomic veterans offer them a most appropriate form.

FRANK H. MURKOWSKI, ALASKA, CHAIRMAN
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STAFF DIRECTOR

United States Senate

COMMITTEE ON VETERANS' AFFAIRS
WASHINGTON, DC 20510

December 4, 1985

Honorable Harry N. Walters
Administrator of Veterans' Affairs
Veterans' Administration
810 Vermont Avenue, N.W.
Washington, D.C. 20420

Dear Harry:

I am writing to follow up on my remarks during the November 14 Senate Veterans' Affairs Committee hearing on issues relating to veterans who were exposed to ionizing radiation. During the hearing I stated that I intended to request the VA to initiate immediately an Ionizing Radiation Registry.

I am now formally requesting that you establish such a registry to provide an ongoing data base of, first, veterans who, as a result of the enactment of Public Law 97-72, are eligible for VA health care and who use or seek to use the VA health care system and, second, veterans who apply for VA compensation for disabilities allegedly resulting from radiation exposure. I believe it would be useful to the VA, to veterans who were exposed to ionizing radiation, and to the Congress if the registry included information encompassing a full case history of a patient's visit -- personal data, medical history, clinical findings, etc. -- including the veteran's name, address, medical history, results of any examinations and clinical findings, VA medical facilities involved, as well as information about the veteran's military service, an estimate of radiation exposure, and any other appropriate findings.

The registry should also document any claims filed for VA compensation for radiation-related diseases resulting from participation in the U.S. atomic weapons test program or the occupation of Hiroshima and Nagasaki. This information should document the veteran's participation in the tests or occupation, an estimate of radiation exposure, the veteran's disability or disabilities, and any VA decisions pertaining to any claims made by or on behalf of the veteran, or the veteran's spouse or survivors.

I believe that a compilation of both the veteran's medical and benefits information related to any ionizing radiation exposure experiences would serve to help detect health trends in such veterans and to indicate any specific characteristics of this particular group of veterans. This is especially critical in light of the recent Office of Technology Assessment determination that an epidemiological study of veterans exposed to ionizing radiation, as required by Public Law 98-160, would not be feasible. The compilation of this information would also serve to consolidate information about such veterans collected by the Department of Medicine and Surgery and the Department of Veterans' Benefits. Consequently, it would expedite the exchange of such information for the purposes of eligibility determinations by VA medical facilities for VA health care services and for the claims adjudication process for radiation-related claims. I wholeheartedly support the VA's Agent Orange Registry and the VA's recent announcement of the forthcoming establishment of a Spinal Cord-Injury Registry and would hope that an Ionizing Radiation Registry would serve a similar purpose.

I request that you carefully consider my request and let me know your plans regarding the establishment of such a registry as soon as possible.

Sincerely,

Frank

Frank H. Murkowski
Chairman

CC: Dr. John Ditzler
R. J. Vogel

Office of the
Administrator
of Veterans Affairs

Washington DC 20420

Veterans
Administration

FEB 11 1986

Honorable Frank H. Murkowski
Chairman, Committee on
Veterans' Affairs
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

In your letter of December 4, 1985, you requested that the Veterans Administration establish a register, first, of veterans who are eligible for care under the authority of Pub. L. No. 97-72 and who use or seek to use the VA health care system and, second, of veterans who apply for compensation for disabilities allegedly resulting from radiation exposure. You further suggested certain forms of data that should be maintained in the register.

The VA has established a method for identifying veterans who apply to the VA for inpatient care under the authority of Pub. L. No. 97-72. This coding system permits us to retrieve from the VA's automated Patient Treatment File summary data concerning these veterans and the location of their permanent medical records. This system has undergone refinement since it was initiated such that we can more easily identify the nuclear weapons test participants seeking care from 1985 onward than we could those seeking care earlier. It would not be practical nor cost-effective to attempt to go back through the earlier records in an attempt to ensure that all of the veterans are incorporated in the more refined system.

From the data that we now have available, and on the basis of current information concerning the types of health problems that might reasonably be anticipated to result from the kinds of radiation exposure the vast majority of the atomic weapons test participants experienced, we do not believe that a medical register of the sort that you propose would be particularly useful or cost effective. However, we will contact the Defense Nuclear Agency which already has some elements of a radiation register to explore the possibility of linking their data with whatever information the VA may have on these veterans.

Concerning the compensation register, we believe that we already have in place a system that substantially meets your suggestion. In 1984, the Compensation and Pension Service of the Department of Veterans Benefits

2.

Honorable Frank H. Murkowski

established a Special Issue Rating System (SIRS) which collects data on claims based on exposure to ionizing radiation and includes service dates, source of exposure (nuclear test, occupation force, therapeutic/occupational, and others), the disabilities claimed, the VA's decision on each disability with respect to service-connection, and the date of the latest rating decision. Data entry is accomplished by adjudication personnel at the regional office level.

SIRS does not store the level of radiation exposure for each veteran. For those veterans exposed to radiation as a result of participation in the atomic weapons testing program or with the occupation forces of Hiroshima or Nagasaki, Japan, however, that information can be obtained, as necessary, from the Defense Nuclear Agency which maintains records of radiation dose estimates on all veterans who file claims for VA benefits. Since this information is readily available, it would be duplicative to store that data in SIRS.

We believe that this approach is a most practical one and is one that addresses most of your concerns.

Sincerely,

Everett Alvarez

EVERETT ALVAREZ, JR.
Acting Administrator

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JONATHAN R. STEINBERG, MINORITY CHIEF COUNSEL/
STAFF DIRECTOR

United States Senate

COMMITTEE ON VETERANS' AFFAIRS
WASHINGTON, DC 20510

December 3, 1985

Honorable Frank H. Murkowski
Chairman
Committee on Veterans' Affairs
Unites States Senate
Washington, D.C. 10510

Dear Frank,

Enclosed are copies of 7 letters, some with enclosures, relating to matters under consideration at the oversight hearing held on November 14, 1985, and more specifically regarding the so-called "Warner Amendment" which, as you know, bars certain suits against nuclear test contractors. As you can see, the authors of the letters are unanimous in their view that the Judiciary Committee is the appopriate committee of jurisdiction to consider any changes in that law, a position I know we both share. So that our November 14, 1985, hearing record will be complete, I request that these letters and enclosures be included in that record.

I also ask that you consider joining with me in a letter to the Judiciary Committee urging that Committee to hold hearings to consider the need for changes in the "Warner Amendment".

Thank you for your cooperation in this matter.

With warm regards,

Cordially,

Alan Cranston
Ranking Minority Member

Enclosures

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SOLDIER
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New York, NY 10010
212/777-3470

NOV 12 REC'D

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I.F. Stone
Studs Terkel
Michael Uhl

Citizen Soldier is a Project of Alternatives to Militarism, Inc. (ATOM Inc.), a tax exempt public foundation

November 1, 1985

Senator Frank Murkowski, Chairman
Senate Committee on Veterans Affairs
414 Russell Bldg.,
Washington, D C 20510

Dear Mr. Murkowski:

We commend your committee for scheduling a hearing on November 14 on the "Warner Amendment" which insulates private contractors from liability for damages arising from nuclear test activity.

We request that you allow me 10 minutes to testify before your committee. I am an attorney who is associated to trial counsel for the Broudy v. U.S. case in California. This is one of only two "atomic veteran" cases which is still currently before a trial court.

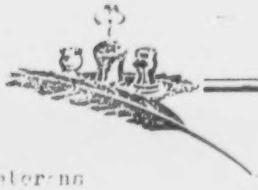
As director of Citizen Soldier, a non profit veterans advocacy organization, I have closely monitored the "atomic veteran" issue since it first emerged in 1977. I am also co-author of "GI Guinea Pigs: How the Pentagon Exposed Our Troops to Hazards Greater than War" Playboy Press (1980) The New York Times reviewer called our book "a thorough and well-researched analysis of the issue."

We also hope that your committee will refer this matter to the Senate Judiciary Committee with the recommendation that the "Warner Amendment" be repealed.

Yours truly,

Thomas Ensign

NOV 2 . [illegible]



Victor F. Tolley
Hiroshima/Nagasaki Veterans
750 Bay Ave. #406
Capitola, Ca. 95010
(408) 475 8161

November 2, 1985

Senator Frank Murkowski, Chairman
Senate Committee on Veterans Affairs
414 Russell Bldg.
Washington, D.C. 20510

Dear Senator Murkowski:

I appreciate very much the hearing you have scheduled for November 14th regarding the "Warner Amendment" that grants private contractors involved in nuclear weapons testing immunity from suit.

I would like to appear and testify at the hearing. I am a member of the National Association of Atomic Veterans and the Hiroshima/Nagasaki Veterans. I served with the Second Marine Division in World War II and was with the occupation troops in Nagasaki, Japan shortly after the atoms bomb was used.

I also request the full committee support referral of this matter to the Senate Judiciary Committee with the recommendation there be a complete repeal of the Warner bill.

Sincerely,

Victor F. Tolley

Victor F. Tolley

Copy: Senator Alan Cranston

AMVETS
TRINITY POST 7-45
American Veterans of World War II, Korea and Vietnam
Room 215, Government Center
175 Lancaster Street
Portland, Maine 04101
(207) 871-8668

From Now
for all time . . .

NOV 12 REC'D

November 5, 1985

Senator Frank Murkowski, Chairman
Senate Committee on Veterans Affairs
414 Russell Building
Washington, D. C. 20510

Dear Sir:

As the Post Commander of America's only nation-wide all-Atomic Veterans Post, please accept my sincere appreciation for scheduling hearings on the so-called Warner Amendment, which prohibits veterans exposed to radiation from suing defense contractors who were involved in the atmospheric nuclear weapons testing program. The objection of our membership to Senator Warner's rider attached to the FY '85 Defense Appropriation Act, is not based on a single narrow point of view. Rather our concerns arise from several approaches which Trinity Post 7-45's men have asked me to convey to you in their name.

First, we find that in 1984, the House of Representatives found that there was cause to believe that Senator Warner's bill, when it was first introduced, violated the Constitution in that it swept into the jurisdiction of the Department of Justice all suits that had been legally filed, prior to the eventual enactment of the Virginia gentleman's proposed legislation. To us, at least as we were taught in school, law which is passed after the fact is unconstitutional (Art. 1, S.10). We further find that this provision has been interpreted as being "...every law which, in relation to the offense or its consequences, alters the situation of a person to his disadvantage." Hilensky v Fields, Fla., 267 So.2d 1, 5. It is no secret that if the Warner Amendment is allowed to stand that the government, which in such situations becomes the contractor's defense attorney,. will automatically resort to the "Feres Doctrine." That the government has successfully stood behind the Feres Doctrine for more than thirty years is evidence enough that Sen. Warner's bill "alters the situation of [the Atomic Veteran] to his disadvantage."

America's Only Post comprised solely of Atomic Veterans

Secondly, what has never before been considered is the fact that neither the military, nor for that matter, the Veterans' Administration, has ever notified an active duty military person or a veteran of the Feres Doctrine. Never, in the collective recollection of our membership, were we ever informed that by serving our country we were voluntarily waiving our Constitutional rights. In fact, by our service we believed we were upholding and defending the Constitution and that the same rights we were seeking to protect by our service also would accrue to us as well. And, during the course of your hearings I would ask that you ask the Department of Defense officials present if they have taken any steps to inform military personnel involved in the nuclear weapons defense system that if they are injured by radiation during peace time that they will be unable to seek redress once they become veterans. At the very least this would seem to be a fair request to make.

Third, the subject of human experimentation on soldiers with radiation has never before been addressed, although it is a matter of record that ten military persons were part of an experiment at Operation GREENHOUSE and another nine are known to have been part of a combination psychological/radiation experiment during Operation PLUMBBOB, Shot Doppler, to be specific. The GREENHOUSE personnel were tested to see whether or not they could wash contaminated soil from their arms and hands. Are these nineteen men excluded from the provisions of the Warner bill or are they included? We should like to see this question addressed and appropriate answers given.

Fourth, Atomic Veterans are further disadvantaged by the VA in that no Atomic Veteran sits on that's organization's Committee on Environmental Hazards. It was reported to this writer personally by John R. Thompson, Esq., Deputy Assistant General Counsel of the VA, that the VA's search committee could not find an Atomic Veteran who was qualified for membership on the panel. This is just another example of how the Atomic Veteran has been disenfranchised and we ask your committee to inquire into the real reason for none of our membership having been chosen.

Fifth, in an enclosure sent with this letter, I draw your attention to the National Academy of Science mortality study of Atomic Veterans, with my rebuttal. These types of studies, with neither the input of Atomic Veterans or appropriate controls to insure that all factors are considered works to our disadvantage in that we have limited resources to counteract the long-term negative effects that such studies create.

Ltr: Sen. Murkowski
Page Three
Nov. 5, 1985

Sixth, our membership finds it difficult to comprehend how a senator can accept thousands of dollars from defense contractors and then introduce legislation which benefits the contributors. Perhaps we are naive when it comes to funding campaigns, but we believe that such actions are not in keeping with the highest traditions of the Senate. When Sen. Warner first announced that he was going to hold hearings on his amendment I personally wrote him a letter of congratulations. To date I have not had the courtesy of a reply.

Seventh, when you consider the Warner Amendment along with the Feres Doctrine, and add to this combination the fact that Title 38 U.S.C., which governs the VA, prohibits judicial review of VA decisions and bars attorneys from charging more than $10, the Atomic Veteran has to ponder why he is up against such a vast array of legal roadblocks. If, as we were told when we were exposed that we had nothing to worry about, why now should we not be allowed our day in court, which is a right guaranteed all other citizens except the Atomic Veteran.

Therefore, in view of the foregoing the members of AMVETS Trinity Post 7-45 respectfully request that your committee vote to refer the Warner Amendment to the full Senate Committee on the Judiciary with the recommendation that not only this particular piece of legislation, but the Feres Doctrine as well, be repealed. Further, we request that we be allowed to appear before your Committee or at the very least, that we be allowed to designate one person as our spokesman.

Respectfully,

Robert L. Campbell
Post Commander

cc: Sen. George J. Mitchell
Sen. William S. Cohen
Rep. John R. McKernan, Jr.
Rep. Olympia J. Snowe
Sen. Alan Cranston
Nat'l AMVETS Commander Robert Medarios
E. Cooper Brown, Esq.

AMVETS TRINITY POST 1945
American Veterans of World War II, Korea and Vietnam
Room 215, Government Center
175 Lancaster Street
Portland, Maine 04101

From Now
for all time . . .

(207) 871-8668

NOV 12 REC'D

October 31, 1985

Mr. Seymour Jablon
%Medical Follow-up Agency
National Research Council
2101 Constitution Avenue, N.W.
Washington, D. C. 20418

Dear Sir:

The purpose of this letter is to both follow up on our conversation of October 12, 1985, at Harvard University, and to bring to your attention, as well as to your colleagues, certain factual problems with assigned dose rates for Operation GREENHOUSE, as appear in the National Research Council study titled: "Mortality of Nuclear Weapons Test Participants," (hereinafter referred to as the "Study"). Additionally, I should like to bring to your attention certain facts concerning Operations CASTLE, PLUMBBOB, and CROSSROADS.

However, I should like to address my self to the further ramifications of the Study itself. First, the Study will be used by the Veterans' Administration in addressing issues raised in claims made by Atomic Veterans. Secondly, the law governing VA claims provides that there can be no judicial review of VA claims if a veteran is dissatisfied with his decision following the final step in the adjudication process. Third, the veteran is already barred from seeking other relief in the courts by reason of the so-called Feres Doctrine, which has now been linked to prohibiting suits by veterans against certain defense contractors involved in the atmospheric nuclear weapons testing program with the passage last year of the Warner Act, which was a last minute amendment added to the FY 85 Defense Appropriations Act. Fourth, the Atomic Veteran has also further had his options diminished by a U.S. Supreme Court decision which bars usage of the Federal Tort Claims Act. As a result of the foregoing, the Atomic Veteran faces a formidable array of challenges. Therefore, the consequences of your Study have far-reaching effects and in turn, it is vital that all facts be considered, and where appropriate the Study be, at a minimum, either revised or withdrawn as the facts dictate.

America's Only Post comprised solely of Atomic Veterans

As you may recall, my first concern dealt specifically with the percentage breakdown of personnel exposures (see: Table 5 in the Study) which purports that only three per cent (3.0%) of Operation GREENHOUSE participants received a dose of 5.0 roentgens or more. My statement to you was that I, as an unbadged person, residing on the residence island of Eniwetok, at Eniwetok Atoll, was assigned an exposure rate of 5.867 r gamma, which was subsequently downgraded to 4.2 r gamma, because it subsequently rained hard, at times, for four (4) days following the final shot (Item). Despite the proposed weathering thesis, which will be dealt with later in this letter, it nonetheless would be appropriate to logically conclude that none of the more than 3,000 personnel residing on the three residence islands could have received a dose less than 5.8 roentgens.

The official Defense Nuclear Agency (DNA) history of Operation GREENHOUSE [DNA 6034F], June 15, 1983, p-232-36], states, in part, "The recent analysis does confirm that all personnel living on these three islands <Eniwetok, Parry, Japtan> of Eniwetok Atoll through the entire series probably exceeded the task force's maximum permissible exposure (mpe) due to the fallout alone." The standard then in effect was 3.9 r for a 13-week period. The duration of the four-shot GREENHOUSE series all took place within an eight-week period. However, as is demonstrated in this paragraph, our exposure did, in fact, exceed the maximum permissible exposure rate. Curiously, all official records concerning this incident are absent any notice of our overexposure being given us or that official waivers, as required by the then Atomic Energy Commission (AEC), were requested. At this point the legal issue of the radiation protocol ensuing from U.S. v Brandt (NWC, Medical Case No. 1) should have at least been considered when the decision not to warn us was made by those legally responsible.

In an June 11, 1981, Jaycor memorandum from Payne Harris, M.D., to the Navy Nuclear Test Personnel Review (NTPR) unit, titled "GREENHOUSE Fallout and Dose Assessment" states, in part, in addressing the fallout created by Shot Dog (11kt), that:

"The DOG shot fallout began at about H+3 hrs. on Eniwetok, Parry and Japtan Islands...When fallout began, a meeting was held at the Rad-safe building on Parry...This group evaluated the situation and concluded the following:

> "4. Usual personnel activities would continue 'ad libitum.' If a person worked inside, he stayed inside. If a person had nothing to do, he went swimming, slept or whatever.
>
> "9. Finally, and most important there would be no disruption of 'living island' routine."

Further, this memorandum goes on to state, in part, that:

"3. Similarly residents of Eniwetok Island accumulated 40% of the Parry DOG and EASY shot fallout and 125% of the ITEM shot fallout on Parry. The accumulated dose on a full-time occupancy base is therefore 3.110R."

As previously noted above my unbadged assessment of 5.8 was downgraded to 4.2. This was done on the basis of the aforementioned memorandum by Dr. Harris, that: "On June 1, heavy rainfall again occurred reducing the fallout dose rate from ITEM shot to background values." However, this memorandum offers no substantial proof, the kind necessary to stand up under legal scrutiny, that this rainfall, in fact, created a "leaching decrease." Evidence establishing a counter-argument for either "leaching" and/or "weathering" of residual radiation created by fallout is contained in the "Enewetak Radiological Survey" [NVO-140, Vol. I-III, October 1973, United States Atomic Energy Commission, Nevada Operations Office, Las Vegas, Nevada). It is to be noted that the last tests at Eniwetok Atoll took place in 1958, and the three-volume study was done in 1973, some 14-15 years following the last detonation. Various encyclopedias establish the annual rainfall in the northern Marshall islands as being between three hundred (300) to four hundred (400) inches annually.

Therefore, it can be argued that if fourteen years of rainfall, based on the figure of three hundred (300) inches per year, could neither "leach" nor "weather" radiation left behind at this atoll that it then becomes to difficult to understand how a mere four (4) days of rain could reduce residual radiation created by Operation GREENHOUSE to background levels.

This proposition is further supported by the "Scientific Director's Report - Operation GREENHOUSE, Radiological Safety - Annex 9.3, AEC Document WT-89, James P. Cooney, Brig. Gen. MC, USA, July 1951.

First, Gen. Cooney's report contains several tables giving the fallout which actually occurred from shots Dog, George and Item. Additionally, this paper goes on to list several problems encountered with measuring equipment, such as the non-arrival on time of a valuable dust collector and pocket dosimeters, which leaked, etc. One comment (p.38) states:

> "A need for readings of beta intensities of a much higher order was found necessary..."

It should also be noted for the record that no GREENHOUSE veteran of which I am aware, has ever been notified of either his alpha or beta exposure. To date all doses have been solely in terms of gamma radiation. A thorough review of this document, especially since it contains shot-by-shot fallout contamination, would be most useful in obtaining a clearer scientific understanding of our exposure as well as monitoring equipment problems.

This citation, plus numerous others contained in the report gives rise to serious questions as to the scientific accuracy of radiation levels as well as to types of radiation. Further, no precise report is given for military and civilian construction workers residing on Engebei island, which also was used as a shot island, and it is this island which members of the October 1973 radiological evaluation team found the highest concentration of Plutonium-239, Cobalt-60, Strontium-90 and Cesium-137.

A further illustration of the problems encountered with measuring devices is contained in WT-111 (EX) Operation GREEHOUSE, Vol. II, Scientific Director's Report, Part III, Evaluation of Programs 3 to 6 and 8 - Nuclear Explosions-1951, which states, on page 7:

> "3.3 RESULTS
>
> "3.3.1 Evaluation of Ground Radiac Equipment

> "(a) Dosimeters. No dosimeter was found to be entirely adequate within the scope of field usage and the military characteristics. Although some instrument types were consistent in themselves, little intercorrelation was observed. The problems of calibration, sensitivity, accuracy, energy dependence, rate dependence, leakage, decomposition, photosensitivity, reliability and ruggedness still have not been completely solved. Dosimeters which reacted favorably in some respects failed in others..."

Thus it would follow that if these latest "state of the art" dosimeters left much to be desired, then it must be reasonably concluded that the standard dosimeter being used at that time also was inadequate. In fact one member of the USS Walker was assigned two different pocket dosimeters for Shot Dog, and five (5) times his dosimeter went off scale!

Returning to the subject of fallout at Operation GREENHOUSE, it has also been observed by the DNA in various letters and publications that the size of fallout particles were too great to be inhaled and/or ingested. However, in the document just cited, it is stated on page 5, that:

> "One rather unexpected result of the tests was an indication that a surprisingly large portion of the radioactivity might have been carried on submicron particles which were too small to be filtered out by the normal filter methods. This was first suspected when the activity collected on the filter papers failed to account for the actual ionization measured by a factor of greater than 50."

An additional point contained in your Study, page 8, states that "Ships remained in the lagoon during the detonation and fallout periods and were subjected to considerable fallout. If this is so, then it directly contradicts the "Analysis of Radiation Exposure for Shipboard Naval Personnel, Operation Greenhouse - SAI 83-874-WA July 30, 1982, which graphically illustrates that all capital ships were at pre-detonation locations well outside the lagoon. This poses the question as to which document is correct, your Study or the document just cited? This type of a situation creates serious doubt as to credibility, and when presented in the fashion of government documents and/or studies such as yours, the data, upon comparison, gives rise to the further question whether such material has been designed to be create disinformation. However, in either form, it is documents such as these upon which the Veterans' Administration places credence in determining claims submitted by Atomic Veterans.

Further disinformation also occurs in your Study where, on page seven (7) it states the approximate number of test participants in Operation GREENHOUSE as being "7,500." However, on page 26, in quoting an official source, the number of participants is given as being "9,350." Then, eleven (11) lines directly above the 9,350 figure it is stated that "7,322 military personnel..."

Also, according to your Study, it is reported (p.27) that the Study covered the time period January 1, 1952 to December 31, 1982. However, it should be noted for that record that I have reported several more deaths of GREENHOUSE personnel from various cancers and cardiovascular disorders, to the DNA during the past year. These new figures could significantly challenge the suppositions set forth in your Study, especially since your findings could easily be interpreted as official government policy in the case of Operation GREENHOUSE. It would have been more honest to add the statement: "Subsequent deaths whose causation can be linked to radiation exposure could alter these figures."

For the record, a June 4, 1985, letter from the Department of the Army (DAAG-ESG-N) to the VA Regional Office, (Togus VA Hospital), Togus, Maine, signed by Richard S. Christian, C.R.M., Director, states, in part:

> "A careful search of dosimetry data reveals no record of radiation exposure for.....The reconstructions that previously were used to provide (the veteran) with a level of radiation exposure potential are currently in the process of being reviewed. We will inform you of the results when it is completed."

In that I am the accredited Service Officer in this case, and as you are aware, am also a veteran of Operation GREENHOUSE, I contacted Dr. David Auton of the Defense Nuclear Agency to request an explanation. My question to Dr. Auton, was to the effect that, "Are you aware of a reassessment being made in the case of GREENHOUSE veterans?" His reply was in the affirmative, with the additional comment that the reassessment was being done, in part, as a result of a January 18, 1985, meeting between he and I at the DNA, as well as subsequent communications and conversations. Further, Dr. Auton informed me verbally that once the reassessment was completed he would personally inform me. As of the date of this letter no such communication has been received by this writer.

The record for Operation GREENHOUSE, for purposes of clarification should also contain, for appropriate consideration, a dying declaration made by Colonel Louis Benne, who was the officer in charge of drone aircraft at that time. Col. Benne's statement which I have submitted to the DNA, asserted that fallout from the first shot (Dog) resulted in "fallout of between 10 and 20 roentgens, with still three more shots to go." This dying declaration was submitted in accordance with Rule 804 (a),(4) and Rule 804 (b),(2), [Rules of Evidence], Federal Rules, Civil Procedure, Evidence, Appellate Procedure, U.S. Code Title 28 (Judiciary and Judicial Procedure), 1982 edition.

As concerns Operation CASTLE, I should like to add, for your consideration the actual construction of Shot Bravo (15MT). This device was, in actuality, a three-state weapon (e.g. a fission-fusion-fission bomb). The hydrogen weapon itself was, in a manner of speaking, wrapped in approximately seven thousand pounds (7,000) of Uranium. The major fallout activity was subsequently discovered as being Uranium-237, the discovery being made by Japanese scientists inspecting the fishing boat Fortunate Dragon. The question posed here for the Atomic Veteran is, can carcinogenic and/or other physical disorders brought on by exposure, which mainly consists of Uranium-237 manifest itself differently from, say, carcinogenics which occur in the bodies of civilians who have never been exposed to radiation?

Secondly, it should be noted for the record that one of the naval vessels participating in this operation was a so-called

"Jeep" carrier, the USS Barokio, which had a wooden flight deck. This becomes significant in light of the finding contained in the book "No Place To Hide," by David Bradley, MD, (a book recounting the author's experience at Operation CROSSROADS), who reported that one of the scientists with whom he worked, one Rex Huff, after conducting several decontamination experiments, concluded that the only way radiation could be extracted from wood was by planing the wood down nearly a quarter of an inch. The ramifications of this finding as regards the USS Barokio is quite apparent. This becomes all the more significant when it is noted that two ocean-going tugs assigned to Operation CROSSROADS, the ATR-40 and ATR-87, were both constructed out of wood! Further, it was later discovered that both of these vessels were sold at auction in Bremerton, Washington and that neither buyer was informed that the vessel had been contaminated. It should further be known the official Deck Logs of these two vessels clearly indicate, according to times established by the DNA in their Fact Sheet on Operation CROSSROADS, that the ATR-87 was ordered into Bikini Lagoon two hours and eleven (2:11) minutes before the lagoon was declared safe to enter and that the ATR-40 was ordered into the lagoon one hour, seventeen minutes (1:17) before the lagoon was declared safe to enter. In addition, neither the ATR-40 nor the ATR-87 were planed prior to being sold.

It should be further noted for the record that several of the ships brought back to the Washington state naval yard from Bikini, after the conclusion of Operation CROSSROADS, for decontamination, were opened for public inspection on Navy Day prior to decontamination being completed.

Turning now to Operation PLUMBBOB. In our private conversation, as well in my public question put to you on the rostrum, my primary concern was the exclusion of members of the Queen's Own Rifles of the Royal Canadian Army who participated in this operation, and more specifically, members of the 2nd Platoon, C Company, who were a part of Task Force Warrior in the Shot Smoky exercise. It seems to me that the Center for Disease Control's study on this particular shot (Smoky) is more of a political study than a scientific one, especially since it knows of the presence of these men, but excluded them for some unspecified reason. It should further be noted for the record that a Status of Forces Agreement existed at that time between the U.S. Government and that of the Government of Canada, which covers liability in joint-military operations involving two or more nations. In that the laws of science are universal it should then follow that neither nationalities nor borders where it concerns science should be taken into consideration. It should also be noted that U.S. and Canadian forces have always fought side-by-side with valor and honor, and given our common bond these men should now be included in your Study.

For the above reasons, it is my sincere hope that the National Academy of Science will withdraw its Study until such time as the questions I have raised are addressed by an independent agency with the full participation by Atomic Veterans, especially since this matter concerns not only the men who have already died, but we who also are still at risk. The Veterans' Administration, when they created the Committee on Environmental Hazards had an opportunity to include Atomic Veterans, but declined to do so saying they could not find an Atomic Veteran who was qualified, although the Public Law which mandated the creation of the panel specified that it would include an Atomic Veteran. By including our participation you will go a long way to repair the ommissions inherent in your Study.

Very truly yours,

Robert L. Campbell
Post Commander

cc: Dr. David Auton, DNA
Gov. Joseph E. Brennan
Sen. William S. Cohen
Sen. George J. Mitchell
Rep. John R. McKernan
Dr. John Gofman
Dr. Carl Johnson
Journal of the American Medical Association
Bulletin of the Atomic Scientist
Dr. James Ruttenber, CDC
Mr. Robert Alvarez
E. Cooper Brown, Esq.
AMVETS National Commander
  Robert Medarios
Dr. Donnell W. Boardman CARS
Sr. Rosalie Bertell, Ph.D
Queen's Own Rifles

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NOV - 8 RECD

November 5, 1985

Senator Frank Murkowski, Chairman
Senate Committee on Veterans Affairs
414 Russell Building
Washington, D. C.
20510

Dear Senator Murkowski:

I am grateful that the Senate Committee on Veterans' Affairs is having a hearing on November 14th, to discuss the Warner Amendment. As an American citizen, I am embarrassed and appalled that a Congressperson would accept $73,000 in campaign funds from defense contractors and then quietly submit legislation that renders them immune from litigation.

It isn't shameful enough that auditors this year, through the House Armed Services Committee, uncovered $109.7 million in "absolutely inexcusable" claims against the Pentagon by seven major defense contractors. Atomic Veterans and workers exposed to ionizing radiation are not able to collect a cent for their cancers and family birth defects, but the government has paid these contractors $959.00 for a golf outing, $10,713 to cover barber shop losses for senior executives, $261.000 for free meals in an executive dining room, to mention only a few atrocities in misspending.

The Veterans' Administration has said that if serious reimbursement were implemented for radiation effects to veterans, etc., the cost to the government might be $23 billion, which the government cannot afford. Curious...there was no problem finding the above mentioned $109.7 million, or the excess of $100 million to be paid to the Marshall Islanders as direct reimbursement for radiation damages to their persons and environment as provided in the Compact of Free Association, which is now being debated in Congress. I also note too, that the government was able to find more than $110 million to clean up Eniwetok Atoll, to say nothing of the millions it must have cost to clean up Bikini Atoll even though that atoll is no longer inhabitable! Interesting that non-Americans seem to have more clout for the same radiation damages.

Also interesting that Robert S. McIntyre (Citizens for Tax Justice) reported that five major defense contractors were among 129 large, profitable corporations that paid no federal income tax at all or received refunds during the 1981 through 1984 period. Thanks to a tax cut, urged by President Reagan and enacted by Congress in 1981, the system of depreciation was accelerated, investment tax credits expanded, and leasing rules liberalized. No wonder, then, that those 129 companies had $66.5 billion in pre-tax domestic profits (1981-84) and received a total $6.4 billion in tax rebates, for a negative tax rate of —9.6 per cent. McIntyre's report identified Boeing Company as "the leading corporate tax avoider" between 1981 and 1984, for receiving $285 million in tax refunds on profits of more than $2 billion.

How paltry the VA's figure of $23 billion seems for radiation damages against the $184.3 billion that the government would have collected in taxes had these companies paid their 46 per cent statutory corporate tax rate on their $400.6 billion in profits.

Meanwhile, my friends die of cancers in their 40's and 50's and their children die of leukemias or suffer from serious birth defects. They and their widows have been denied any benefits and are heavily burdened by medical bills and bankruptcy. How sad that one of the common threads binding the recollection of these veterans is the smell of burning flesh, characteristically the aroma of fallout, which they brushed off their skin and clothes 25-30 years before succumbing to their lung, bone, blood and brain tumors now. My friends include three new widows just this year and a few other aquaintances who will probably not see Christmas.

While my friends are intentionally handicapped by the Warner Amendment and the Civil War era $10 fee limit for lawyers, I read that the government could afford to pay defense contractors $162,149 for promotional giveaways; $100 for an entertainer who performed a disco; $62,071 "to enhance the public image" of a firm following a plane crash involving their manufactured plane.

And so our tax money goes...to cover the defense contractor's overhead expenses (estimated by auditors this past spring, per Rep. Bill Nichols, D.-Ala., that 'up to $1 for every $33 submitted to the government for overhead expenses is questionable' by seven prominent defense contractors, and so the veterans die...unreimbursed or recognized, and my husband could be next. After all, if exposure to radiation and fallout is as safe as he was told--why then would a 100 per cent healthy young soldier of 19 years suddenly lose his hair and all of his teeth within a few months after witnessing four bomb detonations, followed by intermittent blindness, two early age heart attacks, one stroke and attempts to procreate a family result in two miscarriages and one beautiful daughter who died of leukemia???

Because my concern seems justified, I respectfully request permission to appear and testify at your hearing on November 14th. At the very least, could this letter be recorded as a formal request from a U. S. Citizen, mother, registered nurse and wife of an Atomic Veteran that the Warner bill be repealed?

I urge your full committee to support the referral of this matter to the Senate Judiciary Committee with the recommendation that there be a complete repeal of the Warner Amendment.

Please provide radiation victims with at least a ghost of a chance for redress!

Sincerely,

cc: All members of the Senate
Committee on Veterans' Affairs

NOV 12 RECD

NITIJELA OF THE MARSHALL ISLANDS
POST OFFICE BOX 24
MAJURO, MARSHALL ISLANDS 96960
TELEPHONE 321 or 379 — CABLE NITIJELA MAJURO

November 7, 1985

Senator Frank Murkowski
Chairman
Senate Veterans' Affairs Committee
U.S. Senate
414 Russell Bldg.
Washington, D.C. 20510

Re: "Warner Amendment"

Dear Senator Murkowski:

We understand that your hearing of November 14, 1985 before the Senate Veterans' Affairs Committee will address, among other things, the "Warner Amendment" which has had the effect of granting immunity from suit to private contractors involved in the atmospheric nuclear weapons testing program that took place between 1945 and 1962.

We congratulate you for holding this hearing, but wish at the same time to stress that this "Warner legislation" has adversely affected the rights of citizens of the Marshall Islands who have suffered from the radioactive fallout caused by the nuclear testing in the Pacific. Because of this adverse affect on the rights of my people, I urge you to refer this matter to the Judiciary Committee and to support passage of legislation repealing this abuse of human and civil rights.

Sincerely,

Jeton Anjain

Senator Jeton Anjain
Rongelap Atoll
Republic of the Marshall Islands
Trust Territory of the Pacific
Islands

cc. Senator Alan Cranston

P.S. I ask that this letter and the attached statement recently made by myself to the United Nations be included in the official record of your upcoming hearing and made a part of the official record. Thank you.

NITIJELA OF THE MARSHALL ISLANDS
POST OFFICE BOX 24
MAJURO, MARSHALL ISLANDS 96960
TELEPHONE 321 or 379 — CABLE NITIJELA MAJURO

STATEMENT OF SENATOR JETON ANJAIN,
RONGELAP ATOLL,
REPUBLIC OF THE MARSHALL ISLANDS
TRUST TERRITORY OF THE PACIFIC ISLANDS
BEFORE THE
FOURTH COMMITTEE OF THE UNITED NATIONS

OCTOBER 30, 1985

MR. CHAIRMAN AND DISTINGUISHED DELEGATES,

I GREATLY APPRECIATE THIS OPPORTUNITY TO ADDRESS THE FOURTH COMMITTEE OF THE UNITED NATIONS, AND I WISH TO CONGRATULATE THE NEW CHAIRMAN ON HIS RECENT ELECTION.

MY NAME IS JETON ANJAIN AND I AM THE SENATOR FROM RONGELAP ATOLL IN THE MARSHALL ISLANDS IN MICRONESIA. HAVING BEEN TRAINED AS A DENTIST, I PRACTICED DENTISTRY FOR TWENTY-FIVE YEARS IN THE MARSHALL ISLANDS, AND IN 1982 I WAS APPOINTED AS THE MINISTER OF HEALTH FOR THE MARSHALL ISLANDS. I NOW SERVE AS SENATOR FOR MY PEOPLE ON RONGELAP AND DEVOTE ALL OF MY TIME AND ENERGY TO THAT TASK.

AT THE END OF WORLD WAR II, THE UNITED STATES TOOK CONTROL OF THE MORE THAN 2,000 ISLANDS THAT MAKE UP THE ISLAND GROUP CALLED MICRONESIA IN THE CENTRAL PACIFIC OCEAN. IN 1947, MICRONESIA BECAME A TERRITORY OF THE UNITED STATES UNDER THE UNITED NATIONS TRUSTEESHIP SYSTEM, AND OF THE ELEVEN TRUST TERRITORIES CREATED AFTER THE SECOND WORLD WAR, IT WAS THE ONLY ONE DESIGNATED AS A "STRATEGIC TRUST."

UNDER ARTICLE VI OF THE TRUSTEESHIP AGREEMENT, THE UNITED STATES MADE A PROMISE TO THE INTERNATIONAL COMMUNITY THAT IT WOULD "PROTECT THE INHABITANTS AGAINST THE LOSS OF THEIR LANDS AND RESOURCES," AND THAT IT WOULD "PROTECT THE

HEALTH OF THE INHABITANTS" OF THE TRUST TERRITORY.

IN JULY OF 1946, THE UNITED STATES SELECTED BIKINI ATOLL AS THE SITE TO EXPLODE TWO ATOMIC BOMBS IN AN EXPERIMENT KNOWN AS "OPERATION CROSSROADS." IT SHOULD BE POINTED OUT THAT THE "ABLE" AND "BAKER" ATOMIC BOMBS OF "OPERATION CROSSROADS" WERE DETONATED THE YEAR BEFORE THE SIGNING OF THE 1947 TRUST AGREEMENT, AND WE NOW VIEW THAT FACT OF HISTORY AS EVIDENCE OF HOW THE UNITED STATES WOULD ADMINISTER ITS "TRUST" IN THE PACIFIC. UNDER A UNITED NATIONS TRUST AGREEMENT, THE UNITED STATES EXPLODED 66 ATOMIC AND HYDROGEN BOMBS IN OUR ISLANDS, AND EVEN AS I SPEAK TO YOU TODAY, MY PEOPLE ARE CONTINUING TO SUFFER FROM THE RADIOACTIVE LEGACY OF THESE BARBARIC NUCLEAR WEAPONS TESTS. IN MY TRADITIONAL LANGUAGE THERE IS NO WORD FOR "ENEMY," BUT YET, WE NOW CONSIDER IT AN ACT OF WAR THAT THE UNITED STATES CAME TO OUR ISLANDS FOR ONLY ONE PURPOSE: TO EXPLODE NUCLEAR WEAPONS IN THE NAME OF UNITED STATES NATIONAL SECURITY.

IN THE EARLY HOURS OF A STILL DAY ON MARCH 1st, 1954, A BRIGHT FLASH OF LIGHT STREAKED ACROSS THE MORNING SKY. SEVERAL OF MY PEOPLE ON RONGELAP WERE CONFUSED, AS THEY THOUGHT THEY SAW THE LIGHT COMING FROM THE WEST INSTEAD OF A NORMAL SUNRISE IN THE EAST. MINUTES LATER, SEVERAL LOUD SOUNDS, LIKE CLAPS OF THUNDER, PIERCED THE MORNING AIR. A LITTLE WHILE LATER, THE BRIGHT MORNING SKY TURNED GREY, AND A GRITTY ASH FELL OUT OF THE SKY AND COVERED OUR ISLAND. LITTLE DID WE KNOW THEN THAT OUR LIVES WOULD BE

FOREVER CHANGED BY THAT GRITTY ASH THAT FELL OUT OF THE SKY 31 YEARS AGO. AND LITTLE DID MY PEOPLE KNOW THAT WE WERE THE WORLD'S FIRST VICTIMS OF RADIOACTIVE FALLOUT FROM A HYDROGEN BOMB.

AFTER SEVERAL DAYS, MY PEOPLE - AND THE PEOPLE OF UTIRIK SEVERAL HUNDRED MILES AWAY - WERE EVACUATED TO KWAJALEIN ATOLL TO THE SOUTH OF RONGELAP. THE PEOPLE BEGAN TO FEEL VERY SICK AND WEAK, AND MANY BEGAN TO HAVE BURNS ON THEIR BODIES. HAIR BEGAN FALLING OUT OF THEIR HEADS, AND THE UNITED STATES DOCTORS TOLD US THAT THEIR BLOOD COUNTS WENT BELOW 50% THE NORMAL LEVEL. MANY PEOPLE THOUGHT THAT THEY WERE GOING TO DIE FROM THIS NEW SICKNESS, AND IN FACT, WE HAVE BEEN SLOWLY DYING EVER SINCE THAT TRAGIC DAY IN 1954. MYSTERIOUSLY, MOST OF THE PREGNANT WOMEN AT THE TIME EITHER HAD MISCARRIAGES, OR ELSE GAVE BIRTH TO CREATURES THAT DID NOT RESEMBLE HUMAN BEINGS. AFTER 31 YEARS, THE WOMEN OF RONGELAP CONTINUE TO HAVE THESE PROBLEMS WITH REPRODUCTION, AND WE BELIEVE THAT LINGERING RADIATION IS THE CAUSE OF THIS.

BECAUSE OUR HOME ISLANDS WERE SO CONTAMINATED, WE WERE FORCED TO ABANDON OUR HOME OF RONGELAP. FOR THREE YEARS WE BECAME REFUGEES, AND LIVED ON EJIT ISLAND IN MAJURO ATOLL. THEN, IN 1957, THE ATOMIC ENERGY COMMISSION TOLD US THAT WE COULD RETURN HOME. PACKING UP OUR BELONGINGS, WE MADE THE HAPPY JOURNEY BACK TO OUR ANCESTRAL HOME OF RONGELAP.

AFTER SEVERAL YEARS BACK HOME ON RONGELAP, WE THOUGHT

THAT THINGS WERE SLOWLY GETTING BETTER, AND THAT PERHAPS OUR LIVES WOULD RETURN TO A NORMAL STATE. HOW WRONG WE WERE.

IN 1963, THE UNITED STATES DOCTORS DISCOVERED A THYROID TUMOR IN THE NECK OF A RONGELAP WOMAN. THE NEXT YEAR A FEW MORE THYROID TUMORS WERE DISCOVERED. WE BEGAN TO SEE THAT WITH EVERY PASSING YEAR, MORE AND MORE OF OUR PEOPLE WERE BEING STRICKEN WITH THYROID DISEASE, AND ONE BY ONE MY PEOPLE WERE TAKEN TO THE UNITED STATES WHERE MAJOR SURGERY WAS PERFORMED TO REMOVE THEIR THYROID GLANDS. BEGINNING IN 1969, THE PEOPLE OF UTIRIK - WHO WERE 300 MILES DOWNWIND OF THE HYDROGEN BOMB AT BIKINI - BEGAN TO EXPERIENCE THE SAME PROBLEM WITH THYROID TUMORS. THE THYROID DISEASE AMONG MY PEOPLE HAS REACHED EPIDEMIC LEVELS, AND SEVERAL CHILDREN SUFFERED FROM STUNTED GROWTH BECAUSE OF THEIR INJURED THYROID GLANDS.

IN 1972, A NEPHEW OF MINE NAMED LEKOJ ANJAIN DIED OF LEUKEMIA WHEN HE WAS 19 YEARS OLD: LEKOJ WAS ONE-YEAR OLD DURING THE "BRAVO" HYDROGEN BOMB TEST OF 1954 WHEN HE PLAYED IN THE SNOW-LIKE FALLOUT ON THE GROUND. NOT LONG AFTERWARDS, MY BROTHER JOHN - THE FATHER OF LEKOJ - AND HIS WIFE MIJJUA BOTH DEVELOPED THYROID TUMORS. AND I HAVE HAD A CANCEROUS TUMOR REMOVED FROM MY BODY. THE RADIATION FROM THE 1954 "BRAVO" FALLOUT HAS NOT ONLY KILLED AND MAIMED THE PEOPLE OF MY ISLAND, BUT IT HAS TAKEN A PERSONAL TOLL ON THE LIVES OF MY FAMILY MEMBERS. MR. CHAIRMAN AND DISTINGUISHED DELE-

GATES, I DO NOT THINK THIS RADIOACTIVE LEGACY IS WHAT THE INTERNATIONAL COMMUNITY HAD IN MIND WHEN IT TURNED OUR ISLANDS OVER TO THE UNITED STATES UNDER A SACRED TRUST AGREEMENT IN 1947!

AS HEALTH PROBLEMS CONTINUED TO PROLIFERATE MANY YEARS AFTER OUR ORIGINAL EXPOSURE TO HIGH-LEVEL RADIOACTIVE FALLOUT, WE FOUND IT ODD WHEN THE UNITED STATES DOCTORS AND SCIENTISTS KEPT TELLING US THAT THINGS WERE GETTING BETTER, AND THAT THE RADIATION IN OUR ISLANDS WAS GOING AWAY. WE ALSO BEGAN TO WONDER WHO WAS REALLY BENEFITTING FROM THE ANNUAL MEDICAL SURVEYS CONDUCTED BY THE UNITED STATES GOVERNMENT. IT IS FUNNY THAT ALTHOUGH MANY U.S. AGENCIES HAVE COME OUT TO OUR ISLANDS WITH SUPPOSEDLY THE "BEST" DOCTORS IN THE WORLD, WE STILL HAVE NEVER BEEN TAUGHT EVEN THE MOST BASIC FACTS ABOUT OUR UNIQUE EXPOSURE TO RADIOACTIVE FALLOUT. FIRST THE ATOMIC ENERGY COMMISSION CAME TO OUR ISLANDS, THEN CAME THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION, AND NOW WE HAVE THE DEPARTMENT OF ENERGY. THEY KEEP CHANGING THE NAMES OF THESE AGENCIES, BUT THEY NEVER CHANGE THE PEOPLE IN THE AGENCIES.

IN 1978, THE DEPARTMENT OF ENERGY CONDUCTED A RADIOLOGICAL SURVEY OF THE NORTHERN MARSHALL ISLANDS. AT THE CONCLUSION OF THEIR SURVEY, IT WAS REVEALED THAT IN ADDITION TO RONGELAP AND UTIRIK, 12 OTHER ATOLLS AND ISLANDS WERE CONTAMINATED WITH DANGEROUS LEVELS OF FALLOUT FROM THE HYDROGEN BOMB TEST PROGRAM. IN OTHER WORDS, OUR WORST FEARS WERE REALIZED WHEN THE U.S. GOVERNMENT ADMITTED FOR THE FIRST TIME IN 1978 THAT LITERALLY THOUSANDS MORE MARSHALLESE HAD BEEN EXPOSED TO FALLOUT AND

WERE CONTINUING TO LIVE IN A RADIOACTIVE ENVIRONMENT. YET, DESPITE THIS VERY IMPORTANT ADMISSION, ONLY RONGELAP AND UTIRIK ARE RECEIVING U.S. MEDICAL SURVEYS. THIS FACT MAKES A SIMPLE MOCKERY OF ARTICLE VI OF THE TRUST AGREEMENT WHEREBY THE UNITED STATES PLEDGED TO "PROTECT THE HEALTH OF THE INHABITANTS."

FOLLOWING THE 1978 D.O.E. SURVEY, THE PEOPLE OF RONGELAP WERE TOLD TO ABANDON THE NORTHERN HALF OF THEIR ATOLL BECAUSE OF DANGEROUS RADIATION LEVELS. YOU CAN IMAGINE THE GREAT FEARS AND ANXIETIES THIS CAUSED MY PEOPLE WHEN THEY REALIZED THAT SINCE THEIR RETURN AFTER "BRAVO" IN 1957 THAT THEY HAD BEEN EATING FOODS AND LIVING ON ISLANDS IN AN AREA NOW UNDER QUARANTINE! AND IT IS LIKEWISE EASY TO IMAGINE WHY MY PEOPLE BEGAN ACCUSING THE UNITED STATES GOVERNMENT OF USING THEM AS "GUINEA PIGS" IN AN ONGOING HUMAN EXPERIMENT TO STUDY THE LONG-TERM EFFECTS OF HOW RADIATION ENTERS THE HUMAN FOODCHAIN. I HAVE OFTEN THOUGHT THAT THOSE AMERICANS WHO ALLOWED MY PEOPLE TO BE EXPOSED TO RADIOACTIVE FALLOUT, AND SUBSEQUENTLY USED AS HUMAN GUINEA PIGS, SHOULD FACE A NUREMBURG-LIKE TRIBUNAL FOR THE CALLOUS DISREGARD FOR HUMAN LIFE.

FOLLOWING THE 1978 DEPARTMENT OF ENERGY SURVEY, THE D.O.E. PRODUCED A BI-LINGUAL BOOKLET ABOUT RADIATION IN THE NORTHERN MARSHALL ISLANDS. WHEN WE COMPARED THE RADIATION LEVELS OF BIKINI - WHERE 23 ATOMIC AND HYDROGEN BOMB TESTS OCCURRED - AND RONGELAP, WE FOUND VERY LITTLE DIFFERENCE. AND YET, AS THIS COMMITTEE KNOWS, BIKINI IS OFF-LIMITS FOR AT LEAST THE NEXT 100 YEARS WHILE THE PEOPLE OF RONGELAP

HAVE BEEN ALLOWED TO REMAIN IN A VERY DANGEROUS SITUATION SINCE OUR ~~RETURN~~ IN 1957 AFTER THE FALLOUT CAME TO OUR ISLANDS.

IT WAS AFTER WE WERE TOLD THAT ONE-HALF OF OUR ATOLL WAS UNDER QUARANTINE, AND AFTER WE SAW IN THE DEPARTMENT OF ENERGY"S OWN WORDS THAT MANY ISLANDS ON RONGELAP WERE AS CONTAMINATED AS ISLANDS AT BIKINI, THAT WE DECIDED TO TAKE SOME ACTION. IN 1983, PRESIDENT AMATA KABUA AND I INTRODUCED A RESOLUTION INTO OUR PARLIAMENT CALLING FOR THE EVACUATION OF THE RONGELAP PEOPLE. THAT RESOLUTION PASSED UNANIMOUSLY.

IN MAY OF THIS YEAR, THE PEOPLE OF RONGELAP FINALLY DECIDED TO TAKE APPROPRIATE ACTION. WITH THE HELP OF THE ENVIRONMENTAL GROUP GREENPEACE, THE PEOPLE OF RONGELAP TOOK THE DRASTIC STEP OF MOVING AWAY FROM THE DANGEROUS SITUATION ON RONGELAP. WITH THE KIND ASSISTANCE OF GREENPEACE'S FLAGSHIP, THE RAINBOW WARRIOR - WHICH THE FRENCH SAW FIT TO BLOW UP IN AUCKLAND HARBOR - WE MOVED OUR ENTIRE COMMUNITY TO MEJATO ISLAND AT KWAJALEIN ATOLL. I AM CURRENTLY HELPING TO ORGANIZE AN INTERNATIONAL INDEPENDENT RADIOLOGICAL AND HEALTH SURVEY OF RONGELAP IN THE NEXT YEAR SO THAT WE MAY - AT LONG LAST - MAKE AN INTELLIGENT AND INFORMED DECISION ABOUT WHETHER TO RETURN TO RONGELAP, OR WHETHER TO ABANDON OUR HOME ISLANDS.

AT PRESENT, THE UNITED STATES CONGRESS IS ABOUT TO TERMINATE THE STRATEGIC TRUST AGREEMENT WITH THE UNITED

NATIONS. UNDER A QUESTIONABLE LEGAL DOCUMENT KNOWN AS THE COMPACT OF FREE ASSOCIATION, WE WILL ENTER INTO AN AMBIGUOUS RELATIONSHIP WITH THE UNITED STATES THAT IS NEITHER INDEPENDENCE NOR COMPLETE ANNEXATION. HOWEVER, THE ONE CERTAIN FACT UNDER THE COMPACT IS THAT THE U.S. WILL MAINTAIN A MILITARY GRIP ON KWAJALEIN FOR AT LEAST THE NEXT 30 YEARS.

PERHAPS THE MOST TROUBLING PART OF THE COMPACT CONCERNS THE RADIATION VICTIMS IN THE MARSHALL ISLANDS. AT THE MOMENT, MORE THAN FOUR THOUSAND MARSHALLESE HAVE FILED LAWSUITS IN UNITED STATES COURTS FOR RADIATION-INDUCED DAMAGES TO PROPERTY AND HEALTH. UNDER THE SO-CALLED "ESPOUSAL" CLAUSE OF SECTION 177 OF THE COMPACT, ALL OF THESE LAWSUITS WILL BECOME NULL AND VOID, AND ALL FUTURE LAWSUITS FOR LATENT RADIATION DISEASE WILL BE CANCELLED. BECAUSE WE HAVE NEVER HAD THE BENEFIT OF A TRULY INDEPENDENT AND NON-GOVERNMENTAL HEALTH STUDY OF OUR CONTAMINATED ISLANDS, WE STILL DO NOT KNOW JUST HOW EXTENSIVE THE RADIATION DAMAGE REALLY IS. FURTHERMORE, WE HAVE NO IDEA ABOUT THE FUTURE OUTLOOK FOR OUR UNBORN GENERATIONS WHO WILL BE EXPOSED TO RADIOACTIVITY ON MANY ISLANDS IN THE MARSHALLS.

THEREFORE, WE FIND IT RATHER PECULIAR THAT THE U.S. IS SO EAGER TO PREVENT US FROM ALL JUDICIAL PROCEEDINGS STEMMING FROM THE NUCLEAR TESTS, AND WE HONESTLY FEAR THAT THE U.S. MAY KNOW SOMETHING ABOUT OUR FUTURE HEALTH THAT THEY DO NOT WANT US TO KNOW ABOUT. CERTAINLY, THIS VIOLATES BOTH THE LETTER AND THE SPIRIT OF THE 1947 TRUST AGREEMENT.

RECENTLY A RESEARCH ARM OF THE U.S. CONGRESS KNOWN AS THE CONGRESSIONAL RESEARCH SERVICE DID AN ANALYSIS OF THE ESPOUSAL CLAUSE IN THE COMPACT. ACCORDING TO THIS ANALYSIS BY C.R.S., IT HAS BEEN DETERMINED THAT ESPOUSAL IS UNCONSTITUTIONAL AND VIOLATES U.S. LAW. THE REASON GIVEN BY C.R.S. IS THAT BECAUSE THE GOVERNMENT OF THE MARSHALL ISLANDS DOES NOT HAVE SUFFICIENT SOVEREIGNTY EITHER UNDER THE TRUST AGREEMENT OR UNDER THE COMPACT, THAT IT COULD NOT LEGALLY ENACT THE ESPOUSAL PROVISION OF THE COMPACT. I HAVE ATTACHED A COPY OF THIS 5-PAGE C.R.S. ANALYSIS TO MY STATEMENT.

IN CONCLUSION, I MUST CONFESS MY DEEP-FELT DISAPPOINTMENT WITH THE NEARLY FORTY YEAR HISTORY OF UNITED STATES ADMINISTRATION OF OUR ONCE-PEACEFUL AND UNPOLLUTED ISLANDS. MY PEOPLE CONTINUE TO ASK ME WHY THE UNITED NATIONS HAS NEVER REALLY HELPED US. IN FACT, UNDER THE WATCHFUL EYES OF THE TRUSTEESHIP COUNCIL, THE UNITED STATES EXPLODED NUCLEAR BOMBS IN OUR ISLANDS, CAUSED IRREVERSIBLE DESTRUCTION TO OUR HEALTH AND ENVIRONMENT, AND HAS TAMPERED WITH OUR CULTURE IN A WAY THAT HAS DIVIDED US INTO OPPOSING CAMPS. IN THE AFTERMATH OF U.S. ADMINISTRATION, SUICIDE - UNKNOWN AMONG THE MICRONESIAN PEOPLE BEFORE THE PERIOD OF AMERICAN RULE - HAS ONE OF THE HIGHEST RATES IN THE WORLD IN OUR ONCE-PEACEFUL LAND.

IN CLOSING, I FORMALLY REQUEST THAT THE DE-COLONIZATION COMMITTEE SEND A SPECIAL VISITING MISSION TO OUR ISLANDS TO SEE FIRSTHAND WHAT 40 YEARS OF U.S. RULE HAS DONE TO MY

PEOPLE AND TO OUR ISLANDS. SURELY, ON THIS 40th ANNIVERSARY OF THE UNITED NATIONS, IT WOULD SEEM MOST APPROPRIATE FOR THE DE-COLONIZATION COMMITTEE TO DIRECTLY OBSERVE THE LAST REMAINING TRUST TERRITORY BEFORE THE TERMINATION OF THE TRUST AGREEMENT.

LAST AUGUST, THE MEMBERS OF THE SOUTH PACIFIC FORUM SIGNED A TREATY CALLING ON THE FRENCH GOVERNMENT TO STOP ITS NUCLEAR TESTING IN THE PACIFIC. THE REASON THE FORUM NATIONS ARE DEMANDING AN END TO NUCLEAR TESTING IN THEIR BACKYARD IS THAT THEY FEAR THE POSSIBLE ADVERSE HEALTH EFFECTS ASSOCIATED WITH EXPOSURE TO RADIATION. WHEN YOU THINK ABOUT IT, THESE NATIONS ARE TRYING TO PREVENT WHAT HAS ALREADY HAPPENED TO MY PEOPLE. IF NOTHING ELSE, MY PEOPLE SERVE AS A WARNING TO ALL OF HUMANITY ABOUT WHAT NUCLEAR WEAPONS DO TO HUMAN BEINGS. PLEASE, FOR THE SAKE OF OUR CHILDREN AND OUR CHILDREN'S CHILDREN, LET US HEED THE WARNING BY REPLACING AN UNCHECKED NUCLEAR ARMS RACE WITH INTERNATIONAL COOPERATION AND A SANE WORLD ORDER.

NOV 12 REC'D

THE DODD PROJECT
FOR RADIATION STUDIES

November 7, 1985

Senator Frank Murkowski, Chair
Senate Committee on Veterans' Affairs
414 Russell Building
Washington, D.C. 20510

Dear Senator Murkowski:

I am writing to you out of my deep concern regarding the Warner Amendment which, as you know, was passed by Congress last year and grants private contractors involved in nuclear weapons testing immunity from suit. As a private citizen and as a physician who provides medical care to radiation victims, I am troubled, not only by the content of the Amendment, but also by the process by which the Amendment was introduced into and passed by Congress.

I understand that the Senate Veterans' Affairs Committee is holding hearings on November 14th to address the public concerns regarding the Warner Amendment. I am requesting that I be allowed to testify at these hearings so that I may express to you and to the Committee directly my views on how devastating this Amendment is, not only to nuclear test participants, but to all radiation victims in the United States.

I also would like to request that the Senate Veterans' Affairs Committee support referral of this very important matter to the Senate Judiciary Committee with the recommendation that there be a complete repeal of the Warner Amendment.

Thank you very much, Senator Murkowski, for having the hearings and for your consideration of the above requests.

Sincerely,
Susan D. Lambert
Susan D. Lambert, MD, MPH

cc: Senator Cranston

2634 COLLEGE AVENUE, BERKELEY, CALIFORNIA 94704 – (415) 848-2068

THE DODD PROJECT
FOR RADIATION STUDIES

November 7, 1985

United States Senate
Committee on Veterans Affairs
Chair: Honorable Senator Frank Murkowski
414 Russell, Senate Office Building
Washington, D.C. 20510

Dear Senator Murkowski:

I am writing this letter on behalf of the National Association of Radiation Survivors (NARS). I have reviewed the proposed VA regulations required by Public Law 98-542, the "Veterans Dioxin and Radiation Exposure Compensation Standards Act", as published in the Federal Register on April 22, 1985. The following are some comments and recommendations that I have that are based on my experience with the health effects of ionizing radiation.

First of all, in the list of "radiogenic diseases" (Section 3.311b(b)(2)), the VA has omitted polycythemia vera on the grounds that supporting evidence (other than G. Caldwell's study of August 3, 1984) is lacking to demonstrate a causal relationship between the disease and radiation exposure. However, I feel that polycythemia vera is a good example of where the "reasonable doubt policy" (Section 3.102) is applicable. Caldwell's study on the Smoky test revealed 2 cases of polycythemia vera and 2 cases that were suspicious. Although a causal relationship with radiation cannot by any means be proven in these cases, there are no other known risk factors. Certainly the incidence/prevalence of polycythemia vera in nuclear test participants at large needs to be ascertained before Caldwell's findings are believed to be the result of chance or misdiagnosis. To the best of my knowledge, the National Research Council's recent report entitled "Mortality of Nuclear Weapons Test Participants" (May 1985) does not and could not include polycythemia vera as the study involved mortality ascertainment only.

I, therefore, believe that due to uncertainties around the significance of polycythemia vera among nuclear test participants, that veterans with the

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disease be given the benefit of the doubt under the "reasonable doubt policy".

I would also like to recommend that "thyroid adenoma" be added to the list of radiogenic disease. Although the spontaneous rate of thyroid adenoma in the general population is high, it is more common in females than in males. Since most nuclear test participants were male, a thyroid adenoma takes on an added significance. Given the demonstration of an increased incidence of thyroid adenomas among the Marshall Islanders who were dusted with fallout after Shot Bravo in 1954, it seems reasonable that a veteran's claim based on a radiation causation of this disease be considered. This is especially true if the veteran is male and if the thyroid presents with multiple adenomas. This is reasonable because the spontaneous rate of thyroid adenomas is lower among males and because the adenomas found among the Marshallese were generally multiple.

With regard to lung cancer, certain precautions are important here. From my experience with nuclear test participants, I've seen numerous claims for lung cancer denied on the fact that the veteran was a cigarette smoker. Certainly cigarette smoking can cause lung cancer, but it has been demonstrated in numerous studies of uranium miners that even those miners who were nonsmokers, had a significant increase in lung cancer. The BEIR III report states that "the effect of cigarette smoking on (lung cancer) risk estimates cannot be finally evaluated" (page 327). These considerations are extremely important especially since the internal dose (from inhalation of radionuclides) to the nuclear test participants was not monitored and is to this day not known.

The list also includes skin cancer. It is important here to mention malignant melanoma as this skin cancer can be fatal. There is the common belief that ionizing radiation does not cause malignant melanoma. This was challenged by Donald Austin's Lawrence Livermore National Laboratory study (1977) where he found a 3 to 4-fold excess of malignant melanomas among the laboratory's employees. These findings were reaffirmed in a follow-up study of April 1980. There are five occupational risk factors that are causally associated with malignant melanoma among these workers, of which ionizing radiation is one. Therefore, until further information is known about the causation of these skin cancers, it seems prudent to include malignant melanomas among the skin cancers in the proposed VA rules.

Although I have just made a few comments about the "radiogenic disease" list in the proposed VA rules, I want to stress that such a list is prohibitive of noncancerous diseases that may in fact be radiation-induced or even radiation-aggravated. The first and most obvious that comes to mind are cataracts. There is a plethora of ophthalmologic literature to support that ionizing radiation can cause posterior subcapsular cataracts. Certainly this type of cataract should be added to the radiogenic disease list.

Secondly, more all-encompassing and subtle changes induced by radiation are known, such as premature aging. The BEIR III report admits to premature aging effects secondary to radiation exposure (page 501). It is obviously very difficult, if not impossible, to clearly demonstrate premature aging with current state-of-the-art methods. We do know that radiologists experience increased mortality rates from cardiovascular and renal (kidney) disease as compared to other medical professions. This suggests that radiation accelerates the aging process.

I raise the issue of premature aging because I think it would be wise to provide a clause in the proposed VA rules that leaves open the possibility that such disease processes, such as premature aging, can be incorporated in the future should sound scientific and medical evidence provide.

There is one last suggestion that I would like to make and that is with regard to dose estimates being prepared by a "credible source" and the certification of that source "by an appropriate governing body in the field of nuclear medicine or radiology". It seems reasonable to me that a "governing body" in the field of health physics would be equally appropriate and that a nuclear test participant should have the option of an independent (not government related) health physicist to do a dose reconstruction.

Thank you for giving me this opportunity to comment on the proposed VA rules. If you would like me to expound on any points that I have made, I would be very happy to do so.

Sincerely,
Susan D. Lambert
Susan D. Lambert, MD, MPH
(Director, The Dodd Project)

ENVIRONMENTAL POLICY INSTITUTE

EXPERIMENTAL IRRADIATION OF AIRFORCE PERSONNEL DURING OPERATION REDWING -- 1956

BY

ARJUN MAKHIJANI PhD*

A SPECIAL REPORT PREPARED FOR PRESENTATION BEFORE THE
SENATE VETERANS AFFAIRS COMMITTEE

NOVEMBER 14, 1985

* Associate Professor, Capitol Institute of Technology

A joint project of the Environmental Policy Institute and the National Committee for Radiation Victims, 236 Massachusetts Avenue NE, Suite 506 Washington, D.C. 20002

Preface

This report is based upon official documents on various aspects of the U.S. nuclear testing program. The document central to this report is the formerly secret report, now declassifed with deletions, on the experimental irradiation of personnel and aircraft by penetration of the radioactive clouds resulting from nuclear weapons' explosions entitled Early Cloud Penetrations.

This report would not have been possible without the insight and help of Robert Alvarez, Director of the Nuclear Weapons and Power Project of the Environmental Policy Institute. His intimate knowledge with the subject of nuclear testing and related matters has led him to discover and to recognize the significance of many documents and facts, among them the document Early Cloud Penetrations, which is the subject of this report. I would also like to thank E. Cooper Brown, and the National Committee for Radiation Victims which made the resources available for this project. Bernd Franke helped with the internal dose calculations. Elaine Hauschildt of Teamwork, Inc. did her usual letter perfect typing on short notice.

Arjun Makhijani
Silver Spring, Maryland
November 11, 1985

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CHAPTER 1
Summary and Conclusions

> **Maximum dose rates as high as 800 r/hr were encountered, and several flights yielded total radiation doses to crew of 15 r(oentgens), as measured by film badges, and 35 r(oentgens) to 40 r(oentgens), as measured by instrumentation more sensitive to low-energy (gamma) radiation.**
>
> Preliminary Report
> Early Cloud Penetrations
> Armed Forces Special Weapons Project

During Operation Redwing, a series of 17 nuclear weapons' tests at Bikini and Enewetak in 1956, the Commanders of Joint Task Force Seven conducted an experiment in which Air Force personnel and aircraft were deliberately and repeatedly flown through highly radioactive mushroom clouds. This experiment is now officially labeled as Human Experiment #133 by the Department of Energy in its communication with the House Subcommittee on Energy Conservation and Power of the U.S. Congress. The purpose of this experiment was to subject personnel and aircraft to radiation to obtain information which would enable the Air Force to plan operations in and near mushroom clouds in case of nuclear war.

The operation was undertaken with the full knowledge that it was very hazardous and would subject personnel to substantial doses of radiation. As long ago as May 1945, the chief scientist of the team that designed the first atom bomb had warned that "aircraft must avoid coming close to the cloud of (radio)active material."

Drone aircraft sent into the mushroom clouds during the tests after World War II confirmed the lethal levels of radiation generally insignificant during the atmospheric testing program. It does not even discuss them in its Operation Redwing report.

The evidence here supports the general conclusion that the personnel were probably subjected to substantially higher doses of external and, in many cases, internal radiation than the Defense Nuclear Agency has admitted. It also suggests that the Defense Nuclear Agency has at best due to incompetence, or at worst deliberately, kept information regarding the inadequacy of film badge data from the veterans, their families, and the public at large.

in them at times a few minutes after the detonation. A report on Operation Greenhouse said that while some penetrations may be lethal, some pilots may be able to return to base since "the effects of radiation are frequently sufficiently delayed to permit such an operation even though the crew were eventually doomed."

The penetrations of the mushroom clouds were delayed by a few minutes (to a minimum of 20 minutes after the detonation) to avoid immediate radiation sickness. High levels of radiation up to 800 roentgens per hour were encountered by the aircrews. Most of the crew members received well over the maximum permissable radiation level of 3.9 roentgens set for personnel for Operation Redwing. In anticipation of this, a different standard was adopted for the aircrews. They were permitted to receive 3.9 roentgen during a single flight and 20 roentgen during the entire operation. These limits were also exceeded. The maximum recorded dose to a crew member was 40 roentgen. Anywhere from 26 to over 100 personnel were involved in the early cloud penetrations which involved experiments as well as cloud sampling.

One of the most significant aspects of the official preliminary report of the human experiment is that it admits that film badge readings of radiation doses were too low by a factor of two and a half. Thus, when the film badges measured radiation levels of 15 roentgen to the crew, more sensitive instruments measured 35-40 roentgen. This fact has, however, been entirely omitted by the Defense Nuclear Agency in its official assessment in 1982 of the radiation doses at Operation Redwing. The team that prepared the 1982 report was familiar with the special report on the early penetration experiment which stated flatly that film badges were only "minimally responsive" to low-energy radiation. Yet it chose to ignore, perhaps even suppress this fact. The claims of the Defense Nuclear Agency (and through it, those of the Veterans Administration) that film badges are the best available source of external radiation estimates is not correct. This claim has been shown to be technically untenable by the finding of its predecessor agency, the Armed Forces Special Weapons Project that film badges systematically under-record radiation exposures in at least some circumstances. If the same correction factor of 2.5 is applied to all the personnel of Operation Redwing almost 40 percent (about 5,500) of them received doses exceeding the maximum permissable of 3.9 roentgen established for the Operation.

The Defense Nuclear Agency also does not deal with the high likelihood that the many crews which decontaminated the highly radioactive aircraft received internal radiation doses. They wore no respirators as they hosed down the aircraft with high pressure jets. Many marines during Operation Redwing were also in a similar position of cleaning up deliberately contaminated ships by hosing and scrubbing. This created a situation in which personnel were put in an entirely unpredictable situation for which data do not exist for the calculation of internal doses. Yet the Defense Nuclear Agency maintains that internal doses were

CHAPTER 2

Description of the Experiment

Operation Redwing consisted of a series of 17 explosions of thermonuclear weapons (hydrogen bombs) at the Pacific atolls of Bikini and Enewetak in 1956. The purpose of the series was to test the effects of a variety of hydrogen bomb designs for the U.S. nuclear arsenal.[1] A number of "technical experiments were carried out in conjunction with each of the 17 detonations. These experiments measured the yield and efficiency of the devices and attempted to gauge the military effects of the explosions."[2] As a part of this experimental program, the Commander of Joint Task Force Seven, who was responsible for Operation Redwing, conducted an experiment in which Air Force personnel flew B-57B and F-84 planes through the intensely radioactive mushroom clouds that resulted from the thermonuclear explosions.

The purpose of this experiment was to secure information which would enable "the operational commands of the Air Force in their planning to insure the most effective utilization, consistent with crew safety, of aircraft in cloud areas."[3] (As we shall see, considerations of "crew safety" were not based on long term criteria.)

In order to do this operational planning, the command of Joint Task Force Seven decided to conduct Project 2.66, "Early Cloud Penetrations." This would provide detailed data on radiation doses in radioactive clouds:

> "The objective of this project (2.66) was to measure the radiation dose and dose rate one would experience in flying through the cloud resulting from a megaton-range weapon and some factors affecting personnel safety in the event of an operational situation requiring flights through such clouds."[4]

A large amount of specific data was sought. As part of this program, 27 penetrations of radioactive mushroom clouds were made during 6 of the nuclear tests. These shots were code-named CHEROKEE, ZUNI, FLATHEAD, DAKOTA, APACHE, and NAVAJO. (Other planes also penetrated the mushroom clouds of several tests, as parts of other projects.) Five B-57B planes were used. The mushroom clouds were penetrated at times varying between 20 and 78 minutes after the explosions. The data obtained were "on the radiation dose rates inside the cloud, the total dose received in flying through the cloud, and the conditions of flight inside the cloud."[5] In addition, data were sought on "conditions of flight inside the radioactive cloud; i.e., turbulence and icing."[6]

Another part of this experiment consisted of flying F-84 and/or B-57 aircraft through the mushroom clouds in order "to establish the radiation levels on various sections of planes and assess the protection to the aircrew afforded by wearing different types of gloves."[7] These aircraft entered the radioactive clouds at times varying from 24 to 40 minutes after the explosion. In addition to the five B-57B aircraft, one F-84 appears to have been used.

Each aircraft involved in the Early Cloud Penetration experiment was equipped with several specifically designed instruments. The instruments were designed to measure radiation rates, total radiation, degree of aircraft contamination, the time of flight through the radioactive clouds, etc. Since there were only six aircraft involved, each one was used several times. Some aircraft made more than one run through a particular radioactive cloud.

The official report issued by the Defense Nuclear Agency on Operation Redwing as part of its Nuclear Test Personnel Review series has identified only twelve people who were the crews of the six aircraft involved.[8] If this is correct, then it is important to note that these twelve men were involved in several early penetrations of highly radioactive clouds.

While the Early Cloud Penetration experiment was a specific project, with a designated project number, designed to experimentally irradiate the men and aircraft, there was also a program of collecting samples of the radioactive particles in mushroom clouds. This sampling program involved at least five other B-57 and six other F-84G aircraft. Presumably this program gave the Joint Task Force Seven and the Atomic Energy Commission data on the characteristics and efficiency of the explosion. (A similar, complementary effort to collect land fall-out data was also conducted.) The mushroom cloud sampling program involved more than 130 flights into radioactive clouds, at short times after the bombs were detonated. We do not know the number of people involved in this program.

Table 1 shows the number of aircraft involved in each test in the Early Penetration irradiation experiment and in the sampling program. There were a total of 156 flights involved in early radioactive cloud penetrations. The number of penetrations was higher because of multiple penetrations by some aircraft during a single flight.

The largest number of aircraft involved in a single test was 16, according to the Defense Nuclear Agency. This was during shot ZUNI, a three-and-a-half megaton explosion over Bikini on May 28, 1956. Ten of these were B-57's and six were F-84's. The B-57's normally had a crew of two, and the F-84's a crew of one. Thus, at least 26 personnel were involved in the cloud sampling. According to Langdon Harrison, who was present at Operation Redwing, and was a crew member on many cloud sampling flights, over 100 personnel may have been involved in the sampling program alone.

TABLE 1

Number of Aircraft Involved in Early Radioactive Cloud Penetrations During Operation Redwing

	Early Penetration Experiment, Project 2.66		Sampling Program	
SHOT NAME	# of B-57's	# of B-84's	B-57's	F-84's
1. CHEROKEE	1	1	4	6
2. ZUNI	5	-	5	6
3. FLATHEAD	4	-	5	-
4. DAKOTA	(Note 2)	(Note 2)	5	6
5. NAVAJO	5	-	5	4
6. TEWA	-	-	5	4
7. LACROSSE	-	-	2	6
8. YUMA	-	-	-	4
9. ERIE	-	-	2	6
10. SEMINOLE	-	-	2	6
11. BLACKFOOT	-	-	1	6
12. KICKAPOO	-	-	1	6
13. OSAGE	-	-	1	6
14. INCA	-	-	1	6
15. MOHAWK	-	-	6	2
16. APACHE	4	-	5	4
17. HURON	-	-	4	4
TOTAL FLIGHTS	19+	1	53	82

Source: Operation Redwing - 1956, Defense Nuclear Agency, Report No. DNA 6037F, Washington, DC, August 1, 1982; Chapters 4 and 5.

Note 1: The first six tests listed were at Bikini atoll. The rest were an Enewetak.

Note 2: The DAKOTA test was part of Project 2.66, but participating aircraft are not shown in the list in the Defense Nuclear Agency report.

CHAPTER 3

External Radiation Doses

> Maximum radiation dose rates as high as 800 r/hr. were encountered, and several flights yielded total radiation doses to crew of 15 r, as measured by film badges, and 35 to 40 r as measured by instrumentation more sensitive to low-energy radiation.[10]

Air Force personnel were sent into the radioactive mushroom clouds with the full knowledge that it was dangerous and could result in heavy radiation doses. As early as May 11, 1945, more than 2 months before the first atomic explosion near Alamogordo in New Mexico, J. Robert Oppenheimer, who headed the scientific team that designed that first atomic bomb, had warned against it. In his prediction of the effects of the first atomic bomb he warned that "(a)ircraft must maintain a minimum distance from the detonation in order to avoid radiation.... Following aircraft must avoid coming close to the could of (radio)active material, and monitoring to determine the extent and disposition of the (radio)activity will be necessary if aircraft are to enter the area within hours of the primary detonation."[11] In Operation Redwing, aircraft entered the radioactive cloud as early as 20 minutes after the detonations.

In atomic bomb tests after the World War II, drone aircraft were used to measure radiation levels inside the radioactive clouds. Drones were sent into the clouds of the three atomic explosions of Operation Sandstone, at Bikini atoll in 1948. These drones measured radiation levels of up to 1,000 roentgens per minute at times about 7 minutes after the detonation.[12] A report of the subject concluded that radiation in radioactive clouds "would be sufficiently high as to provide considerable hazard and therefore such contact should be avoided (by personnel). If the mushroom head of the cloud is penetrated the external radiation would frequently be ... lethal."[13] The report also speculated on the question as to whether the crew of a manned flight would be too sick to return to base:

> However, such a return (to base) does not appear to be ruled out. For the effects of radiation exposure are frequently sufficiently delayed to permit such an operation even though the crew were eventually doomed.[14]

Subsequent drone penetrations of mushroom clouds during Operation Greenhouse in 1951, confirmed the high levels of radiation and danger of entry. Yet, the first manned penetrations were conducted during Operation Teapot in 1955.[15] We have not studied the manned penetrations during Operation Teapot.

The manned penetrations during Operation Redwing were delayed to 20 minutes or more, which was sufficient to prevent immediate symptoms, and to allow return to base. They were, however, made in full recognition of the great danger of high radiation rates. The radiation standards for the aircrews of the experiment were quite different from those of the rest of the personnel of Operation Redwing.

The crews involved in the Early Penetration experiment encountered high radiation levels on most flights. The recorded radiation rates ranged up to 800 roentgens/hour (approximately 800 rads/hour) during the early penetrations.[16] Since the decision-makers of Joint Task Force Seven had anticipated high radiation levels, they set different standards for the experimental personnel than for the other personnel involved in Operation Redwing. The total maximum permissible exposure to external (gamma) radiation established for the 13-week duration of Operation Redwing was 3.9 roentgens.[17] The limit "for the aircrews on this project was 50 r(oentgens) with a limiting planning dosage of 25 r for any single penetration."[18] It appears from this passage that the limits were the sum of the external radiation to be received by the two crew members. The maximum dose for each crew member, therefore, appears to have been 25 rads, with a sublimit of 12.5 rads per penetration. The exposure standards, as distinct from the "planning" figures above were different. According to this, the maximum exposure to external radiation per crew member was to be 20 roentgens (gamma only).

In addition, there was a "stipulation that if an aircrew member accumulated 3.9 r or more on any one mission, no second mission would be authorized before a lapse of 13 weeks had occurred."[19]

The standards were apparently violated, as best as we have been able to determine. Even the planning figures were exceeded on several occasions. The most sensitive electronic instruments on the aircraft recorded total exposure to the crew of 35 to 40 roentgens on several flights. The film badges recorded only 15 roentgens. The discrepancies were not due to recording errors. They were attributed by the project report to the fact that the electronic instruments were able to measure relatively low-energy gamma radiation, while "the film is only minimally responsive to such radiation."[20] It is important to note that "low-energy gamma radiation," emitted by some radioactive elements, is roughly ten times or more powerful than relatively high-energy X-rays.*

The higher doses are mentioned in the preliminary project report of December 1, 1956, but glossed over. It claims that the operation went off as planned since "(n)o penetrations were made in which the maximum dose to be expected, as measured by Rad-Safe film badges, would exceed 25 r."[23] In a further bit of sophistry, it added that "(s)ince film dosimetry is more widely accepted as an indicator of whole-body radiation dosage, the film data were used to give dose rates or dosages in all figures and tables presented in this report, unless otherwise specified.[24]

The Defense Nuclear Agency has suppressed the higher, more accurate dose data altogether. In its 1982 report it does not mention that film badges under-recorded the radiation dose by more than a factor of two. Throughout its report on Operation Redwing it treats film badge data as if they accurately measured external gamma radiation doses.

Using these film badge readings, it reports that only 12 people, all Air Force personnel, received over 10 roentgens, and that the highest dose was 16.4 roentgens. If these readings were adjusted for under-recording of low-energy gamma rays by a factor

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High energy X-rays have on the order to 10 kiloelectron volts (KeV) per photon of energy.[21] The lowest energy measured reliably by the electronic "P-meter" on the cloud penetration aircraft was 80 KeV.[22]

of 2.5, it would mean that the highest dose of external radiation alone was 40 roentgens and that 12 persons got more than 25 roentgens. The number of people with over 10 roentgens would increase from 12 to over 1,100. A similar adjustment of all external doses by a factor of 2.5 would increase the estimate of the number of personnel who received more than the official limit of 3.9 roentgens from about 1,200 to about 5,500 or about 40 percent of the personnel who participated in Operation Redwing. In practice, external dose estimates would not be so easy to determine. Besides the well-known problems with interpretation of badge dark spots (which indicate irradiation of the badges), deterioration of badges with wear, etc., a simple scaling up does not address the question of the proportion of low-energy gamma radiation encountered by operation personnel. Since this proportion varies with time, a detailed knowledge of each individual's activities and the time of these activities is necessary. In such an endeavor, a detailed survey of every atomic veteran would appear to be essential. This the Defense Nuclear Agency and the Veterans Administration has refused to do.

The question of the validity of film badge data goes far beyond this particular experiment or even the entire operation. It goes to the heart of the "dose reconstruction" method used by the Defense Nuclear Agency. These data are also the basis on which the Veterans Administration makes its decisions on veterans' claims. Both these agencies have treated film badge data as accurate. The entire reporting of doses by the Defense Nuclear Agency for all external doses is based almost solely on film badge data. When badge data are not available for individuals, the data of others are used to infer the doses. In spite of many criticisms of its methods, the Defense Nuclear Agency has persisted in using the badge data as the best and most accurate estimating method for radiation doses.

The preliminary report Early Cloud Penetrations which is the subject of the present analysis was, however, an official report of the Armed Forces Special Weapons Project, which was the name of the Defense Nuclear Agency in the 1950's. In effect, one of the Agency's own reports noted almost 30 years ago that film-badge data were systematic underestimates of external gamma radiation doses because the badges were only "minimally responsive" to low-energy gamma radiation. It also had instruments available which could have been used to improve readings and estimates. Instead, it appears that the Defense Nuclear Agency had deliberately chosen not to report this large under-recording of radiation doses by film badges.

It is, perhaps, also significant that the official Defense Nuclear Agency Report of Operation Redwing issued in 1982, lists the Early Cloud Penetrations as "not available" to the public, and among those documents which may "become available during the declassification review process."[26] However, the preliminary report entitled Early Cloud Penetration was declassified in April 1960, and available to the public by the Office of Technical Services of the Department of Commerce as long ago as 1960. The author of the present analysis obtained his copy from the Library of Congress. It is remarkable that a report which had been declassified (with deletions) for over 20 years, with all copies presumably so marked, was listed as "not available" by the Defense Nuclear Agency in 1982.

There are further questions regarding the Defense Nuclear Agency's assessment of doses for the aircrews involved in the early cloud penetration experiment. It lists the highest recorded (film-badge) external dose as 16.4 roentgens. The Early Cloud Penetration report states that the "maximum total dose received by a crew member during a penetration flight ... was approximately 16 r, as measured by film dosimetry."[27] Further, the report states that total dose to the crew exceeded 15 roentgens on "several flights." This is more than 7.5 roentgens per crew member. Thus, for the maximum dose over the entire experiment to have been 16.4 roentgens would probably have required a considerably larger number of crew members than the 12 acknowledged in the 1982 Defense Nuclear Agency report.

Many of the cloud sampling crews also probably received large doses of radiation. Cloud sampling involved flying into the mushroom cloud or through the stem of the mushroom cloud in order to collect outside air laden with radioactive particles. This was pumped into compressed air tanks carried in the aircraft. According to Langdon Harrison, who was part of the sampling crew, collection of a sufficient quantity of air often required several passes through the stem.[28]

It is difficult to form an accurate picture of the external radiation doses received by the aircrews involved in the early penetration experiment and in cloud sampling. However, we have enough data to know that many received large doses of whole body radiation. A dozen or more may have received over 25 rads of external radiation during the flights above, when the film-badge dose rates are adjusted for under-recording. They undoubtedly received further doses during the rest of their stay and in their other activities during Operation Redwing.

CHAPTER 4

Internal Radiation

There is practically no discussion of internal radiation during Operating Redwing in the official report of the Defense Nuclear Agency. This question is also not mentioned in the edited, public version of the report on early cloud penetrations. We understand that the cloud penetration aircrews wore masks and were supplied with pure oxygen for breathing.[29] We do not know if the radioactive air from the cloud was filtered and taken in to maintain internal cabin pressure. In that case, it is likely that the internal surfaces of the aircraft and its equipment may have become substantially contaminated. Of course, the external aircraft surfaces and engines became intensely radioactive. About 15 percent of the external radiation dose to the crews during flight was during the return flight, after exit from the mushroom cloud. The flights through the mushroom clouds varied between 1 and 5 minutes, and return flights were about 50 minutes. Some sampling crews who repeatedly penetrated the radioactive cloud may have had higher doses if they stayed in flight longer.

The radiation danger to the crews did not stop with the flight, of course. Like all other personnel they were exposed to the hazards of living and working in a radioactive environment during most of the 13-week duration of Operation Redwing.

We do not have a description of the other activities of the aircrews. However, much of the work on the ground associated with the project, in particular the decontamination of the early penetration and sampling aircraft, is quite likely to have resulted in substantial internal radiation. It was apparently not the practive to wear masks while decontaminating aircraft and other equipment. These were hosed down by personnel using high-pressure water jets, as can be seen from the photographs in Figures 1 and 2. The high-pressure jets undoubtedly caused substantial quantities of radioactive contaminants to be come suspended in the air. Figure 3 shows the forehead of a person marked as contaminated as the rest of him is being checked. The amounts of radioactive materials that were inhaled by the personnel probably varied greatly from one person to the next and there is now no way to determine what these were. Given the heavy contamination of the aircraft and the clearly dangerous nature of the practice, and the failure to issue respirators (which were available), there is a strong case to be made for presuming that the atomic veterans who have radiation-related diseases that their official duties during the tests caused or contributed to their diseases.

The case for this is especially strong since it was common to conduct hazardous decontamination activities without respirators. For example, three ships, YAG-39, YAG-40, and Crook County, were experimentally contaminated with fall-out during Operation Redwing. Experimental decontamination methods "such as firehosing, hand-scrubbing, and hot liquid jet cleaning" were tried out on these ships.[30] The Defense Nuclear Agency lists external doses (film-badge) only for two civilian personnel. However, the actual decontamination was probably caried out by

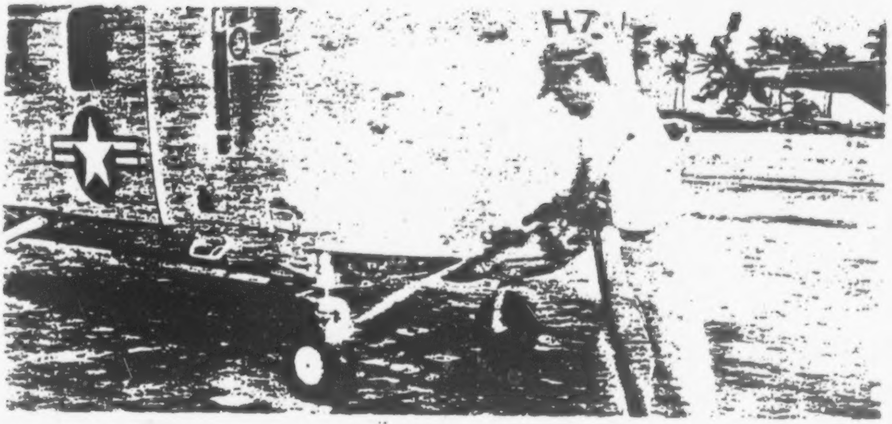

Figure 1 Removing radioactivity from a helicopter, REDWING.

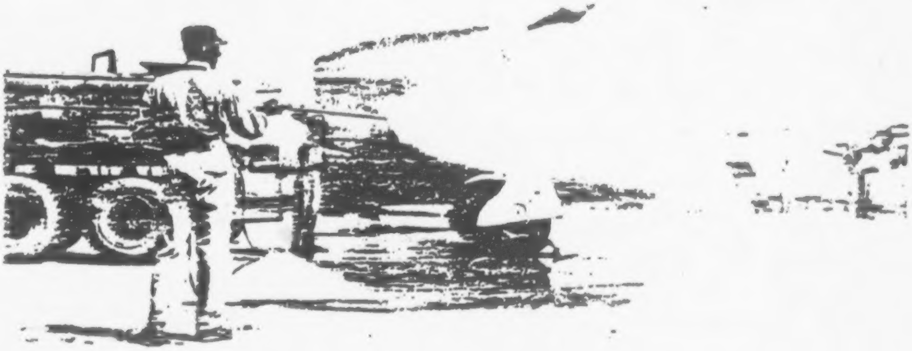

Figure 2 Decontaminating a B-57 sampler aircraft after flight through a nuclear cloud, REDWING.

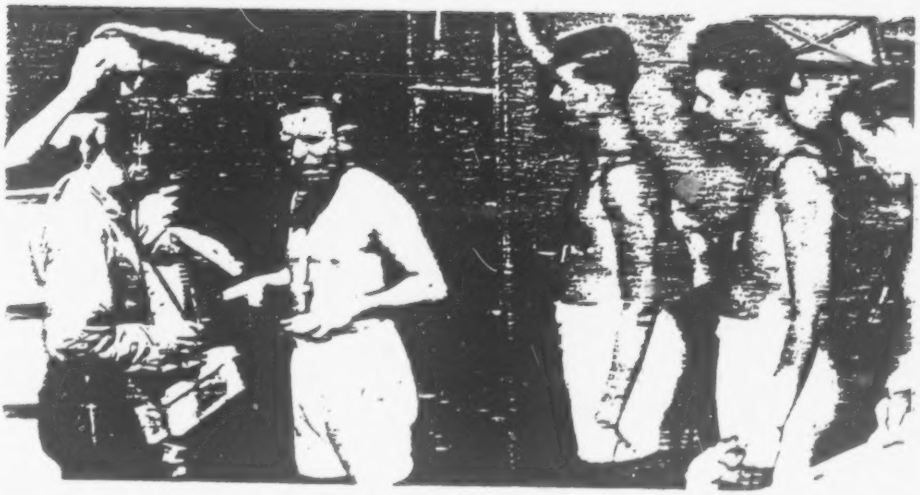

Figure 3 Decontamination monitor locating and marking spots of radioactivity on personnel returning from a radex area, REDWING.

marines based on the USS Estes and the USS Curtis, and possibly by other personnel. The official record on this point is "not clear."[31] Radiation levels on these ships were sometimes quite high and the surfaces heavily contaminated. It is likely that much, perhaps all, of this decontamination work was done without the benefit of respirators.

There are other examples of decisions which resulted in increased personnel exposure and internal radiation hazards. The largest single case was the decision not to evacuate Enewetak after fall-out from shot TEWA at Bikini drifted toward Enewetak and came down on it for 17 hours, accompanied by several rain showers. Rain samples were found to be heavily contaminated as were puddles of rainwater on the runway and parking area.[32] There was a substantial increase in external gamma radiation doses due to this fall-out -- the initial estimate was 2.5 roentgens. "Later estimates indicated ... about 3 to 6 R actual exposure."[33] Thus, many of the large number of personnel stationed on Enewetak were subjected to radiation doses exceeding the total allowable limit for the operation during this one fall-out episode above.

The Joint Task Force command, instead of evacuating Enewetak "later authorized raising the maximum permissable exposure from 3.9 R to 7 R for the Redwing Operation."[34] In spite of the likelihood of internal doses to at least some participants, the Defense Nuclear Agency's report contains no discussion or estimates of such doses.

In one accident connected with a project on neutron flux measurements, "a plutonium foil split open, releasing an estimated 100 mg of oxidized plutonium into the counting trailer. Alpha contamination was spread to other areas, unfortunately, as project personnel continued to use the trailer after the accident. Monitoring subsequently showed that 10 persons had been contaminated. Twenty-hour urine specimens contained low levels of plutonium."[35] Urine samples are well recognized to be poor indicator of the amount of ingestion or inhalation. However, since plutonium was definitely present in 10 people, some estimates of the internal dose could have been given. But the Defense Nuclear Agency did not do so in its report on dose estimates.

Like the problem of film badges, and perhaps more insidious, the Defense Nuclear Agency has consistently taken the position that internal doses were insignificant during the U.S. atmospheric testing program. This conclusion is unwarranted. Few measurements were actually made. Fall-out patterns are erratic with unpredictably located "hot spots." Individuals did widely varying kinds of work, some very dangerous such as hosing and scrubbing, often with poor protection against inhalation and sometimes ingestion. A study of Operation Crossroads in 1946, based on the papers of the Chief of the Radiological Safety Section, Colonel Stafford Warren, done two years ago, quoted documents saying that due to the "extensive and unpredictable" extent of the alpha (plutonium) contamination, "no one can say any place is safe for any length of time" from the dangers of ingestion or inhalation of radioactive particles.[36]. Yet the Defense Nuclear Agency continues to insist that almost all occupied places were safe almost all of the time and that interval doses were insignificant. This is an unscientific claim.

Even the maximum limits for radioactive materials' concentration in air and water adopted by Joint Task Force Seven were questionable, at best. The standard adopted initially for air was 10^{-6} microcuries per cc of particles less than 5 microns in air. Even this was apparently later abandoned.[37] A hypothetical calculation will illustrate how dangerous this can be. If the entire contamination were due to strontium-90, and the air had the maximum permissable contamination, the lifetime dose to the bone marrow due to breating such air for 13 weeks would be over 3,000 rems. [38] This would be very likely to cause leukemia. Of course, in practice, most radionuclides are not as effective in irradiating bone marrow, so that the actual dose to the bone marrow from a "typical" mixture might be a factor of 100 less or 30 rem -- still large. However, other organs would also be irradiated, and hence the chances of other cancers would also increase. A rough estimate is that the absolute risk of contracting some cancer due to a dose of 30 rem over the entire body is about 3 percent. Similar figures are obtained if one attempts computations based on the drinking water standard of 5×10^{-3} microcuries per cc adopted for Operation Redwing.

We do not know whether the actual contamination was above or below these limits, or how much it varied over time and from place to place. This reinforces the conclusion that it is exceedingly difficult in any specific case to determine such doses. The best way would actually be to do a thorough epidemiological study, estimate the increases in radiation related diseases over the expected (in a well defined control group). Special epidemiological studies of high risk personnel such as cloud penetration experiment and cloud sampling air crews are also critically needed. From such a study, it may be possible to infer internal dose magnitudes. However, the Defense Nuclear Agency and the Veterans Administration have consistently refused to do such a study, while at the same time denying atomic veterans the benefit of the very serious doubts and uncertanties which exist.

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22. Reference #3; p. 14.

23. Reference #3; p. 22.

24. Reference #3; p. 23-27.

25. Reference #2; p. 4 and p. 333. The numbers of personnel receiving more than 10 roentgens after adjusting for the under-recording of low-energy gamma radiation was obtained by adding up the total number of personnel receiving 4 roentgens or more as measured by film badges, shown in p. 333. A similar adjustment was done for the 3.9 roentgen limit.

26. Reference #2; p. 336 and p. 345.

27. Reference #3; p. 28-32. (Page 28-32 is one page in the public edited version of the report.)

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ITR-1320(Del.)

PRELIMINARY REPORT

Operation REDWING

PACIFIC PROVING GROUNDS

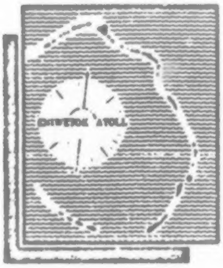
May - July 1956

Photostat Price $ [illegible]
Microfilm Price $ [illegible]

Available from the
Office of Technical Services
Department of Commerce
Washington 25, D. C. 29-1-

Project 2.66

EARLY CLOUD PENETRATIONS



HEADQUARTERS FIELD COMMAND, ARMED FORCES SPECIAL WEAPONS PROJECT
SANDIA BASE, ALBUQUERQUE, NEW MEXICO

NOTICE

This report is published in the interest of providing information which may prove of value to the reader in his study of effects data derived principally from nuclear weapons tests.

This document is based on information available at the time of preparation which may have subsequently been expanded and re-evaluated. Also, in preparing this report for publication, some classified material may have been removed. Users are cautioned to avoid interpretations and conclusions based on unknown or incomplete data.

AEC Technical Information Service Extension
Oak Ridge, Tennessee

OPERATION REDWING - PRELIMINARY REPORT

PROJECT 2.66

SEPTEMBER 1956

EARLY CLOUD PENETRATIONS

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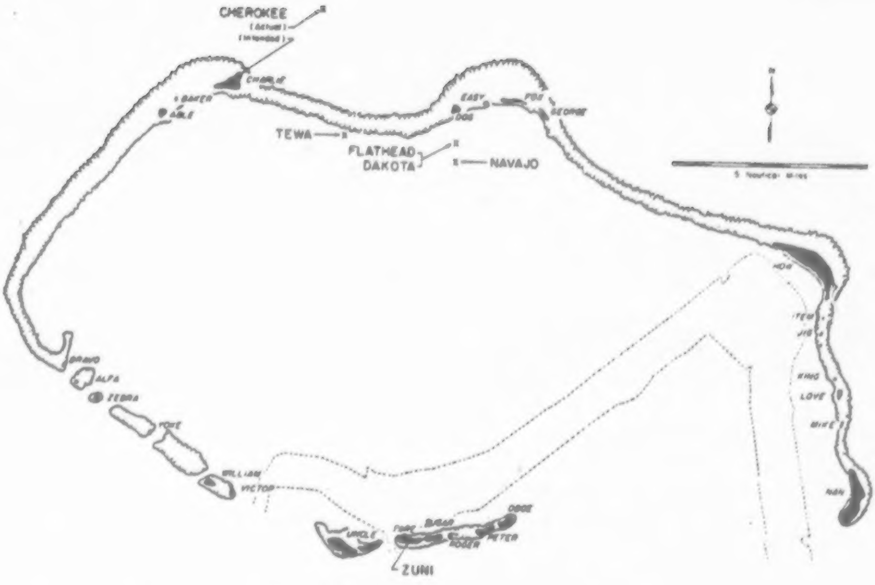
Director, Program 2

SUMMARY OF SHOT DATA, OPERATION REDWING

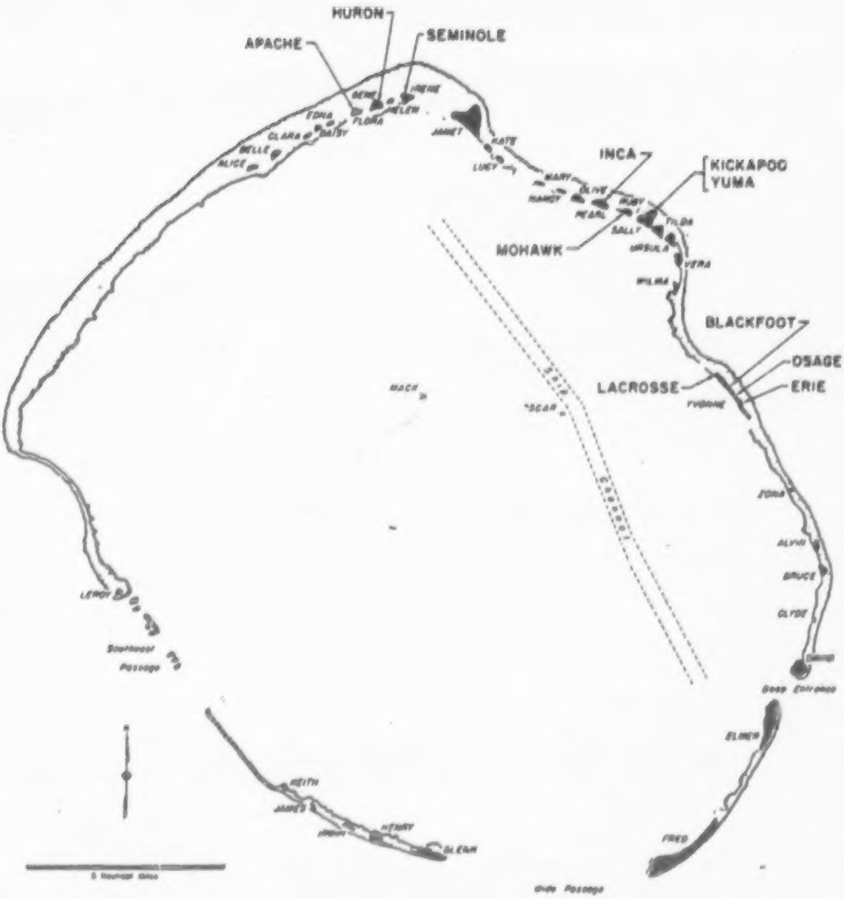
Shot Name (Unclassified)	Date (PPO)	Time (Approximate)	Location	Type	H&N Coordinates (Actual Ground Zero)	Geographic
						° ′ ″
Lacrosse	5 May	0629	Eniwetok Yvonne	Surface Land	124515 E 106885 N	11 33 29 162 21 18
Cherokee	21 May	0551	Bikini Off Charlie	Air Drop Over Water	96200 ± 100 E 185100 ± 500 N	11 43 50 165 19 46
Zuni	28 May	0556	Bikini Tare	Surface Land Water	110309 E 100154 N	11 29 48 165 22 09
Yuma	28 May	0756	Eniwetok Sally	200-ft Tower	112155 E 130604 N	11 37 24 162 19 13
Erie	31 May	0615	Eniwetok Yvonne	300-ft Tower	127930 E 102060 N	11 32 41 162 21 52
Seminole	6 June	1255	Eniwetok Irene	Surface Land[a]	75237 E 149897 E	11 40 35 162 13 02
Flathead	12 June	0626	Bikini Off Dog	Barge Water	116768 E 164094 N	11 40 22 165 23 13
Blackfoot	12 June	0626	Eniwetok Yvonne	200-ft Tower	126080 E 104435 N	11 33 04 162 21 33
Kickapoo	14 June	1126	Eniwetok Sally	300-ft Tower	114018 E 132295 N	11 37 41 162 19 32
Osage	16 June	1314	Eniwetok Yvonne	Air Drop Over Land	126647 ± 50 E 102851 ± 50 N	11 32 48 162 21 39
Inca	22 June	0956	Eniwetok Pearl	200-ft Tower	105300 E 133540 N	11 37 53 162 18 04
Dakota	26 June	0606	Bikini Off Dog	Barge Water	116767 E 164097 N	11 40 22 165 23 13
Mohawk	3 July	0606	Eniwetok Ruby	300-ft Tower	109737 E 132165 N	11 37 39 162 18 49
Apache	9 July	0606	Eniwetok Flora	Barge Water	69227 E 148063 N	11 40 17 162 12 01
Navajo	11 July	0556	Bikini Off Dog	Barge Water	116816 E 160604 N	11 39 48 165 23 14
Tewa	21 July	0546	Bikini Charlie-Dog Reef	Barge Water	99776 E 164476 N	11 40 26 165 20 22
Huron	22 July	0616	Eniwetok Flora	Barge Water	70015 E 148304 N	11 40 19 162 12 09

[a] See ITR-1344 for further details.


CHEROKEE
(Actual)
(Intended)
CHARLIE
BAKER
ABLE
TEWA
FLATHEAD
DAKOTA
NAVAJO
EASY
FOX
DOG
GEORGE
N
5 Nautical Miles
HOW
ITEM
JIG
KING
LOVE
MIKE
NAN
BRAVO
ALFA
ZEBRA
YOKE
WILLIAM
VICTOR
UNCLE
TARE
SUGAR
ROGER
PETER
OBOE
ZUNI

Airukiiji	Oboe	Bokoaetoktoku	Alfa	Eniirikku	Uncle	Rochikarai	Love
Airukiraru	Peter	Bokobyaadaa	Able	Enisman	Tare	Romurikku	Fox
Aomoen	George	Bokonejien	Baker	Enyu	Nan	Rukoji	Victor
Arriikan	Yoke	Bokonfuaaku	Rom	Ionchebi	Mike	Uorikku	Easy
Bigiren	Roger	Bokororyuru	Bravo	Nama	Charley	Yomyaran	Jig
Bikini	How	Chieerete	William	Ourukaen	Zebra	Yurochi	Dog
		Eniairo	King	Reere	Sugar		

Bikini Atoll. Locations of test detonations during Operation REDWING are indicated by large lettering and arrows. Native island names with corresponding military identifiers are given in the tabulation.


HURON
APACHE
SEMINOLE
IRENE
GENE
HELEN
FLORA
EDNA
CLARA
DAISY
BELLE
ALICE
JANET
KATE
LUCY
INCA
KICKAPOO
YUMA
MARY
NANCY
OLIVE
PEARL
RUBY
SALLY
TILDA
MOHAWK
URSULA
VERA
WILMA
BLACKFOOT
OSAGE
LACROSSE
ERIE
YVONNE
MACK
OSCAR
Deep Channel
ZONA
ALVIN
BRUCE
CLYDE
DAVID
Deep Entrance
ELMER
FRED
LEROY
Southwest Passage
KEITH
JAMES
IRWIN
HENRY
GLENN
Wide Passage
5 Nautical Miles

Aaraanbiru	Vera	Chinieero	Alvin	Igurin	Glenn	Ribaion	James
Aitsu	Olive	Chinimi	Clyde	Japtan	David	Rigili	Leroy
Aniyaanii	Bruce	Cochita	Daisy	Kirinian	Lucy	Rojoa	Ursula
Aomon	Sally	Coral Heads	Mack, Oscar	"M"	Zona	Ruchi	Clara
Biijiri	Tilda	Eberiru	Ruby	Mui	Henry	Rujoru	Pearl
Bogairikk	Helen	Elugelab	Flora	Muzin	Kate	Runit	Yvonne
Bogallua	Alice	Engebi	Janet	Parry	Elmer	Sandildefonso	Edna
Bogombogo	Belle	Eniwetok	Fred	Piirai	Wilma	Teiteiripucchi	Gene
Bogon	Irene	Girinien	Keith	Pokon	Irwin	Teiri	Nancy
Bokonaarappu	Mary						

Eniwetok Atoll. Locations of test detonations during Operation REDWING are indicated by large lettering and arrows. Native island names with corresponding military identifiers are given in the tabulation.

SECRET – RESTRICTED DATA

DEDICATION

This report is dedicated to Paul Marcus Crumley, Captain, United States Air Force, who gave his life on the 18th day of May, 1956 in the prosecution of this work. He did much of the work of assembling the material and planning all the details necessary to the proper conduct of the project. May this report and the value of this work stand as a small evidence that he did not die in vain.

ABSTRACT

Twenty-seven penetrations of six radiation clouds from multimegaton-range detonations were made at times ranging from 20 to 78 minutes after detonation and at altitudes ranging from 20,000 to 50,000 feet. Sixteen of these penetrations were earlier than 45 minutes and seven were earlier than 30 minutes.

Maximum radiation dose rates as high as 800 r/hr were encountered, and several flights yielded total radiation doses to the crew of 15 r, as measured by film badges, and 35 to 40 r, as measured by instrumentation more sensitive to low-energy radiation.

It was found that the average radiation dose rate in the mushroom of the cloud from a 100-percent-fission-yield detonation would be:

$$\bar{D} = 1.0 \times 10^5 t^{-1.7}$$

Where: $\bar{D}$ = Average dose rate, r/hr.
t = Time after detonation, minutes.

This relationship holds for times from 3 to 80 minutes after detonation.

The average dose rate in the stem of the cloud from water-surface bursts was found to be less than the dose rate in the mushroom by a factor of from five to ten. The radiation dose rate in the cloud is independent of yield, but is proportional to the ratio of fission yield to total yield.

In a high tropopause area, a flight through a cloud from a 100-percent-fission-yield multimegaton-range weapon in a high-performance aircraft may be made at 45,000 feet at a time of 20 minutes after detonation. The average mission dose of this flight would be 25 r. At 30,000 feet, a penetration of the stem of the cloud may be made as early as 10 minutes after detonation with a radiation dose of the same magnitude.

The dosage received on the return to base flight due to contamination on the aircraft (B-57B) was found to be about 15 percent of the total mission dose for flights lasting about 50 minutes after the cloud penetration.

ACKNOWLEDGMENTS

The authors wish to acknowledge the assistance of a large number of persons who contributed to the success of Project 2.66.

The following members of the Air Force Special Weapons Center, Kirtland Air Force Base, New Mexico, contributed materially to the execution of general or specific parts of the project: Major J. L. Dick and M/Sgt J. M. Pulliam who assisted in the film measurements of total dose and of contamination on the aircraft, and Capt R. F. Merian, 1/Lt M. V. Harlow, Jr., 1/Lt D. L. Endsley, 2/Lt R. L. Capener, and M/Sgt W. P. Schaus, Sr., who contributed to the development, maintenance, and repeated calibration of the electronic instruments. The same individuals installed these instruments in the aircraft prior to each shot and read out the data after each shot. Lt Col L. A. Kiley and 1/Lt W. C. Jones rendered excellent rear-echelon logistic support to the project.

Mr. G. E. Koch aided the project materially by providing technical advice on the electronic instrumentation at the test site.

The project is indebted to the Tactical Air Command for the assignment of the aircraft and the selection of exceptionally fine officers and maintenance personnel to support the flight requirements of the project. The officers and men of the flight element, under command of Lt Col W. B. Furman, performed an outstanding job of maintaining and flying these aircraft. The project officers are grateful to these officers and men for their contributions to the success of the flights and, hence, the success attained by the project.

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CHAPTER 1

INTRODUCTION

1.1 OBJECTIVE

The objective of this project was to measure the radiation dose and dose rate one would experience in flying through the cloud resulting from a megaton-range weapon and some factors affecting personnel safety in the event of an operational situation requiring flights through such clouds.

Specific information was sought on the radiation dose rates inside the cloud, the total dose received in flying through such a cloud, the total dose received on the return flight after flying through the cloud, and the conditions of flight inside the cloud.

This information is needed by the operational commands of the Air Force in their planning to insure the most-effective utilization, consistent with crew safety, of aircraft in cloud areas.

1.2 BACKGROUND AND THEORY

During Operation GREENHOUSE the first significant data on gamma dose rates within atomic clouds were collected. These are reported in Reference 1. The data were collected by drone aircraft flown through the clouds from weapons ranging in yield and at times of from 3 to 25 minutes after detonation. Reference 1 shows average gamma dose rates within the cloud to be of the orders of 10^4 r/hr from 3 to 5 minutes after detonation and 350 r/hr at 20 minutes after detonation.

Further measurements of gamma dose rates within atomic clouds were made in Operation UPSHOT-KNOTHOLE and reported in Reference 2. Dose-rate-measuring instruments were mounted in parachute-borne canisters, and the dose-rate instruments previously used by the Naval Radiological Defense Laboratory (NRDL) in Operation GREENHOUSE (Reference 1) were mounted in QF-80 drone aircraft. Both the canisters and the QF-80's passed through only the head, or mushroom, of the clouds resulting from weapons ranging in size. Dose rates of the order of 10^4 r/hr were measured from 2 to 6 minutes after detonation.

A compilation of the GREENHOUSE and UPSHOT-KNOTHOLE average dose rates as a function of time after detonation is presented graphically in Reference 2. These points are also included in Figure 3.2 of this report. The time after detonation for each point is the approximate time after detonation at which the airplane or canister entered the cloud. A least-square analysis of the data showed that the best-fit line had the equation:

$$\bar{D} = 1.31 \times 10^5 t^{-2.06} \qquad (1.1)$$

Where: $\bar{D}$ = Average dose rate, r/hr.
t = Time after detonation, minutes.

Consideration of Reference 2 led to the following generalizations which were used as guides in the initial planning of this project: (1) The dose rate in the cloud is relatively independent of yield. (2) Within a factor of two, the average dose rate in a cloud is given by Equation 1.1.

The first manned penetrations at early times after detonation (17 to 41 minutes) were made during Operation TEAPOT. These penetrations were made through clouds from weapons ranging in yield.
The average dose rate in the cloud as measured during these penetrations is shown graphically in Figure 3.2.

The gamma radiation dose rate within the atomic cloud resulting from kiloton-range weapons has received theoretical consideration in References 3, 4, 5, 6, and 7. The outstanding features of many of these calculations are the very-high gamma dose rates predicted for very-early times due to small cloud size and high fission-product concentration.

CHAPTER 2

PROCEDURE

2.1 OPERATION

Five B-57B aircraft which were instrumented to measure gamma radiation dose rate, integrated dose, and conditions of flight were flown through the clouds resulting from the detonation of six weapons ranging in yield.

On the day prior to a shot, all of the instrumentation was checked for proper operation, installed in the aircraft, and readied for use. The flight crews were briefed on the desired flight pattern, altitudes and times of penetrations, and forecast development characteristics of the cloud. These characteristics included size, stabilization levels, and drift.

All aircraft took off at predetermined times in order to permit proper positioning at shot time. After the shot was fired, the cloud was surveyed visually by the director in the lead aircraft. Positions and times of penetration were then finalized. Penetrations were made at intervals of from 4 to 10 minutes and at varying altitudes. This time spacing permitted some of the results of the first penetrations to be used in planning the succeeding penetrations.

Two types of maneuver were utilized in the penetration phase. In both cases the cloud was approached in straight and level flight. After entering the visible cloud, the pilot either executed a standard 180-degree turn and made his exit or continued on a straight course through the cloud. The type of maneuver to be employed was decided prior to the penetration run. However, the aircrews were briefed on emergency procedures which permitted changing from the straight-through to the 180-degree-turn maneuver at their discretion if excessively high dose rates were encountered. A dose rate two times greater than the predicted dose rate was considered excessive. Upon exit from the cloud, the aircraft returned to base and the records were removed immediately for analysis.

2.2 INSTRUMENTATION

The following instruments and devices were used to obtain data for this project: (1) KAEC Model M1432 automatic-recording radiation-rate meter (P-Meter); (2) Bioscel (IM-111 (XE-1)/UD) radiation-rate meter; (3) Sigmatron radiation-integrating dosimeter; (4) quartz-fiber dosimeters (Bendix Models 619 and 622) radiation integrating dosimeter; (5) National Bureau of Standards (NBS) film packs radiation-integrating dosimeter; (6) Rad-Safe personnel film badge, radiation-integrating dosimeter; (7) AN/PDR-39 (T1B) radiation-rate meter; (8) intervalometer; and (9) photopanel.

The last two are not radiac devices, but are included in this section for convenience of presentation. A description of each device is given below. All radiation-measuring devices were calibrated at NBS prior to the Operation. They were recalibrated intermittently at the test site using a Co^{60} source.

2.2.1 KAEC Model M1432 Automatic-Recording Radiation-Rate Meter (P-Meter). The P-Meter was designed and built by the West Coast Electronics Laboratory of the Kaiser Aircraft and Electronics Corporation at Palo Alto, California, under contract with and according to specifications furnished by Air Force Special Weapons Center (AFSWC). Seven complete assemblies were procured. The equipment consisted of three airborne components (probe, power supply, and compressor-amplifier-recorder unit) and one nonairborne component (playback unit). A block diagram showing the relationship of these units constitutes Figure 2.1.

The entire airborne assembly was mounted in the nose section of a B-57B. The instruments were operated by the 28-volt aircraft power supply. The wire recorder could be started manually at any time during the flight by means of a switch in the pilot's compartment. It could also be started automatically by use of the intervalometer setting. Once turned on, it continued to record until the recording wire was completely used (about 2 1/2 hours) or until the power was turned off.

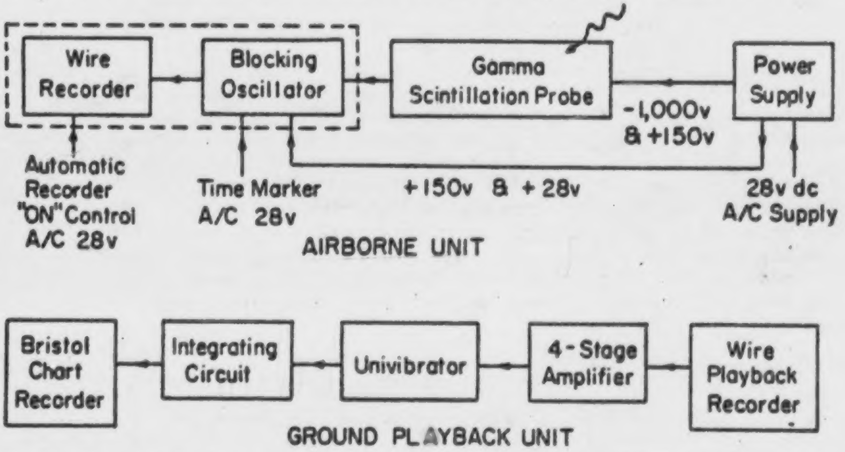
Wire Recorder
Blocking Oscillator
Gamma Scintillation Probe
Power Supply
-1,000v & +150v
Automatic Recorder "ON" Control A/C 28v
Time Marker A/C 28v
+150v & +28v
28v dc A/C Supply
AIRBORNE UNIT
Bristol Chart Recorder
Integrating Circuit
Univibrator
4-Stage Amplifier
Wire Playback Recorder
GROUND PLAYBACK UNIT

Figure 2.1 Block diagram of automatic recording radiation rate meter (P-Meter).

The probe was the sensing element and consisted of a Scintilon (trade name used by National Radiac Company) sphere, DuMont 6292 photo-multiplier tube, and a regulated voltage divider with temperature compensation. This was housed in a 2 1/2-inch diameter aluminum tube having a wall thickness of 1/16 inch with an added 0.01 inch of tin outside the hemispherical end that covered the Scintilon. The inside of this hemisphere was coated with zinc sulfide in order to enhance low-energy response so that satisfactory performance was obtained from 80 kev up to 1.3 Mev.

The compressor-amplifier-recorder unit received current from (i.e., supplied electrons to) the probe. The intensity of this current varied linearly with the dose rate. This current is supplied by a cathode-biased low-mu triode (CK6152) and results in a logarithmic variation of the plate voltage of this tube. This plate voltage is connected to the grid of a blocking oscillator (CK5703WA) through a high resistance. The frequency of the blocking oscillator is thus made to vary as the logarithm of the dose rate, and after amplification through another CK5703WA, the output is impressed on the recording head of the wire recorder.

The power supply consisted of six 26A7-GT tubes connected in parallel so as to oscillate at about 1,000 cps when fed 28 volts from the aircraft power supply. The output of the tubes is stepped up, rectified, and regulated to result in +150 volts for B+ voltage in the compressor-amplifier-recorder and -1,000 volts for the photomultiplier tube in the probe.

The playback unit consisted of a playback recorder of the same type as was used for taking data during penetrations. The frequency-modulated output of the playback unit was amplified, pulse-shaped, and integrated. This integrated, slowly varying direct current was then applied to the input of a standard 12-inch-strip chart recorder (Bristol Model 1892). A logarithmic presentation of dose rates from 1 r/hr to 5,000 r/hr was given on the chart. Calibration tests at NBS using Co^{60} have indicated an overall read-out accuracy of ± 20 percent over the range from 1 r/hr to 2,000 r/hr.

2.2.2 Bioscel Radiation-Rate Meter. The Bioscel was designed and built by the Evans Signal Laboratory of the U. S. Army Signal Corps in accordance with specifications furnished by the Air Force Special Weapons Center (AFSWC). Type designation IM-111 (XE-1)/UD was obtained through Army channels. Twenty of these units were procured. Two complete Bioscels were installed in each aircraft with the sensing elements located directly behind the pilot's seat. Data obtained with one instrument were recorded by photographing a remote meter mounted in the photopanel. The remote meter from the second instrument was placed in the pilot's compartment, above and to the right of the instrument panel. As shown in Figure 2.2, the instrument consisted of an ion chamber, an amplifier, a control panel, a battery container, and an indicating meter which presented rates from 1 r/hr to 2,000 r/hr. All of these components, except the meter and its cabling, were contained in a cylindrical aluminum housing 3 inches in diameter and 10 inches in length which had a flange at the control panel for mounting.

The ion chamber and amplifier were potted together in the ion-chamber-assembly module. The potting compound was an epoxy resin, which gave an hermetically sealed unit. The unit passed tests for leakage at $-55^{\circ}F$ and 0.1 psi. The ion-chamber volume was 85 cm^3. The applied sweep-out voltage was approximately 7 volts. This resulted in nonsaturated operation and produced a roughly logarithmic indication on the meter. Calibration was obtained by varying this voltage between 6.3 and 8.8 volts. Zero adjustment was made before use (or calibration) by adjustment of coarse and fine rheostats in the cathode circuit, through which resistances a voltage drop was obtained to actuate the meter.

The battery box is a separate module from the ion chamber assembly module and was located in the end of the tubular aluminum housing farthest from the control panel. It contained three BA-1318/U and one 1328/U batteries. These were sufficient to furnish continuous operation for 200 hours.

2.2.3 Sigmatron Radiation Integrating Dosimeter. The Sigmatron was built by the Research Directorate of AFSWC, Kirtland Air Force Base (KAFB), and was based on a similar design used by Los Alamos Scientific Laboratory (LASL) for a much-lower-range instrument, called the "Integron." Eighteen of these units were built. The ion chamber which was used was designed and built by NRDL to meet specifications prepared by AFSWC. The information furnished by the instrument is total gamma dosage, with two ranges (25 r and 100 r full scale) available by changing an internal connection. Two Sigmatrons were used in each airplane, mounted just behind the pilot, with a remote meter for each. One meter was in the photopanel and the other was in the pilot's compartment. The first prototype of this instrument tested at NBS integrated total dosage with an accuracy of ± 20 percent at energies higher than about 125 kev. At 80 kev the loss in response was only about 25 percent. Accuracy was independent of rate up to 2,000 r/hr.

A block diagram of the Sigmatron is shown in Figure 2.3. The instrument operated as follows: The ion chamber had a sensitivity of 1.1

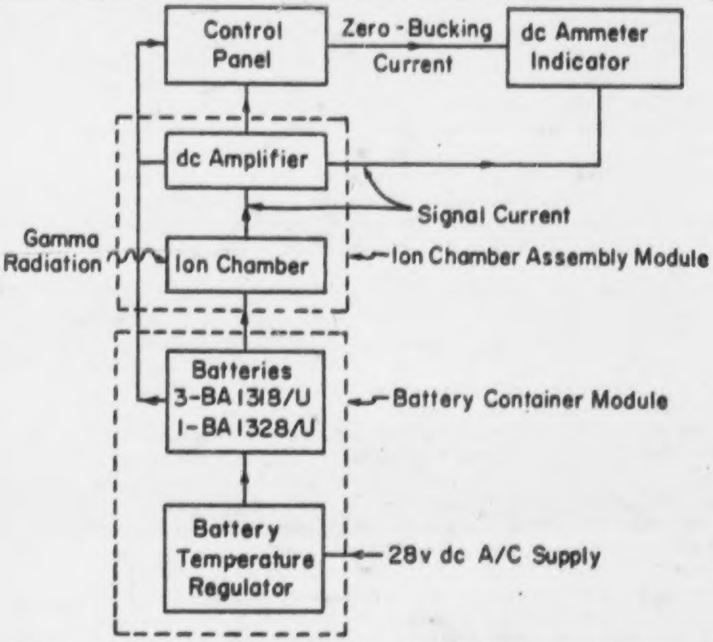
Control Panel
Zero-Bucking Current
dc Ammeter Indicator
dc Amplifier
Signal Current
Gamma Radiation
Ion Chamber
Ion Chamber Assembly Module
Batteries 3-BA1318/U 1-BA1328/U
Battery Container Module
Battery Temperature Regulator
28v dc A/C Supply

Figure 2.2 Block diagram of Bioscel radiation-rate meter.

x 10^{-8} amp/r/hr and insulation of more than 10^{13} ohms. The integrating capacitors (0.3 and 1.3 microfarads) had a time constant of more than 3 days. These capacitors were in the electrometer circuit. The ion-chamber current charged whichever capacitor was in use so as to reduce the grid potential of a CK5886 electrometer tube and, hence, increase the positive plate voltage of a CK526AX amplifier tube. This increased plate voltage resulted in an increased cathode current in this tube. This increased cathode current raised the cathode potential and caused a current to flow in the microammeter loop. It also resulted in negative feedback in the input to the CK5886, since it tended to cancel out the voltage produced by charging the integrating capacitors. The negative feedback had the beneficial action of effectively multiplying the capacity of the capicators without increasing the leakage; hence, the dynamic range of the instrument was extended without exceeding the straight-line portion of the I_p versus I_g characteristic curve of the CK5886.

The three instruments just discussed (P-Meter, Bioscel, and Sigmatron) all have a response time of less than 1 second for 100 percent response.

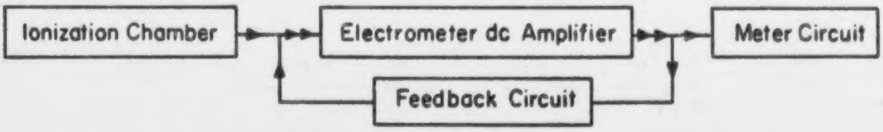

Figure 2.3 Block diagram of Sigmatron radiation-integrating dosimeter.

2.2.4 Other Dosimeters. The integrated gamma radiation dose during cloud passage and on the return flight was measured by a number of standard integrating dosimeters. Each crew member carried pencil-type dosimeters and a Rad-Safe film badge. Quartz-fiber dosimeters were mounted in the cockpit to record the total dose received on the mission. The NBS packs were placed in both the pilot's and observer's compartments. The NBS film packs were also mounted in the nose compartment for comparison of the total dose received in the nose with that received in the cockpit. This latter comparison was necessary, because the P-Meter was mounted in the nose compartment while the sensing elements of all other instruments were in the cockpit.

The AN/PDR-39 (T1B) is a standard Air Force gamma rate meter and was used to follow the decay rate in the pilot's and observer's positions after completion of the flight. This study continued for 12 hours. Information concerning this instrument can be obtained through Air Force supply channels.

2.2.5 Intervalometer. The intervalometer, as its name implies, was a device used to actuate the camera in the photopanel at selectable intervals. It was designed and built by the 4925th Test Group (Atomic) at KAFB. One of these instruments, along with the associated photopanel control box was mounted in each airplane. The intervalometer was placed in the nose compartment, and the control box was located to the right of the pilot.

The actuating signals to the camera were fed through microswitches actuated by two separate cams driven by a common motor. This arrangement provided two speeds, "fast" (approximately 3 signals per second) and "slow" (approximately 3 signals per minute). Either could be selected manually by the pilot by means of a switch on the control box. Two camera speeds were required in order to economise on film, yet obtain rapid photographs in the radiation cloud. In addition, there was a third position marked "auto" which automatically changed the speed from "slow" to "fast" when the ambient radiation exceeded a given level, usually set between 1 and 10 r/hr. This part of the circuit is described in the next paragraph.

A dynamotor driven by the airplane's 28-volt power supply provided +150 volts dc, which was converted to -700 volts dc by means of a multivibrator, amplifier, and filter. This -700 volts was connected to ground through an Anton 5980/BS-2 Geiger-Muller tube and a 1.2-megohm resistor. A 0.0001-microfarad condenser connected the junction of these two elements to the grid of a CK5814 tube and, in conjunction with the resistor, determined the quench of the Geiger-Muller tube. As the radiation field increased, the Geiger-Muller tube broke down more often, sending negative pulses through the condenser to a CK5814 tube. These pulses were amplified and inverted in a subsequent stage and were fed through the coil of a relay. When the repetition rate became sufficiently great (at a rate somewhat lower than the maximum allowed by the quench circuit), the direct-current component of the pulses became sufficient to close the relay, which in turn closed a second relay which switched the interval control from "slow" to "fast." When the radiation rate diminished sufficiently, the interval control reverted to "slow" automatically.

2.2.6 Photopanel. The camera and photopanel located in the nose of the aircraft were used to photograph the meters from the Sigmatron and Bioscel, whose sensing elements were located in the cockpit. Also installed in the photopanel were a clock, altimeter, accelerometer, and airspeed indicator. When correlated with the radiac instrument readings, these gave a record of time in cloud, altitude of penetration, and conditions of flight within the cloud. The photopanel also contained a small marker light. This was controlled by a toggle switch on the photopanel control box. Using this light the pilot could mark the film at specific times, such as cloud entry and exit.

The camera used was a Vought 16-mm recording camera loaded with 100 feet of Eastman Special Emulsion (SO 1112) film. This film is not fogged by gamma doses of less than 500 r. Suitable lighting was included to provide the intense light required for this special film. The lights and the camera utilised the aircraft's 28-volt power supply.

2.3 DESCRIPTION OF REQUIRED DATA

In order to satisfy the purposes of this project, accurate information was required on the following parameters: (1) time of penetration of the radioactive cloud; (2) total radiation dose on the flight; (3) radiation dose accumulated in transit of the radioactive cloud; (4) length of time required to fly through the cloud; (5) radiation dose accumulated on the flight back to base due to contamination on the aircraft; (6) maximum dose rate in the radioactive cloud; (7) dose rate in the crew compartment immediately after exit from the cloud due to contamination on the aircraft; (8) the rate of decay of this contamination; and (9) conditions of flight inside the radioactive cloud, i.e., turbulence and icing.

All of these data, except the last, were recorded automatically with the instrumentation described in Section 2.2. The items of information desired from each flight and the instruments which were used to provide them are summarized in Table 2.1 Most of the information was available directly from the installed instrumentation, while some additional information was obtained by indirect methods as indicated in Sections 2.3.1 through 2.3.9. It should be noted that these indirect methods constituted, in every case, a duplicate method for obtaining a check on the same data obtained by one or more direct measurements.

In addition, the pilot (and observer when present) made observations during the flight on the following parameters: (1) dimensions of the cloud at various altitudes prior to penetration; (2) time and altitude of penetration; (3) type of penetration; (4) length of time in the radioactive cloud; (5) maximum dose rate in the cloud; (6) dose rate in the cockpit on exit from the cloud due to contamination on the aircraft; (7) accumulated dose in the cockpit at time of exit from the cloud; and (8) degree of turbulence and icing noted during passage through the radioactive cloud.

These observations were reported to the flight director in the air and were transcribed from the pilot's and director's notes during the post-flight debriefing. These observations by the pilot duplicate information recorded automatically by the instrumentation in the aircraft in all cases except icing conditions in the cloud.

2.3.1 Total Radiation Dose. The total radiation dose was measured directly by the Sigmatrons, quartz-fiber dosimeters, NBS film packs, and Rad-Safe film badges. It was also obtained by integrating the area under the dose-rate-versus-time curves yielded by the P-Meter and the Bioscel mounted in the photopanel.

2.3.2 Length of Time in Cloud. The pilot flashed the marker light on the photopanel at the times which he considered to be his entry and exit from the cloud. Time in the visible cloud was then computed by observation of the clock in the photopanel pictures. Time in the radiation cloud was obtained from the P-Meter and Bioscel data. These two instruments provided curves of dose rate as a function of time. For purposes of this calculation, the entry and exit were considered to be those times at which the dose rate was 5 percent of the maximum rate observed.

2.3.3 Radiation Dose in Cloud. The radiation dose received in the cloud was measured by integration of the area under the P-Meter and Bioscel curves between cloud entry and cloud exit. The Sigmatron in the photopanel also gave a direct indication of dose in the cloud. It required only that the meter be observed in the film frames where the marker light occurred.

The NBC film packs gave an indirect measure of the dose in the cloud. This was computed by subtracting the return flight dose which was calculated from the T1B decay-rate measurements from the total dose indicated by the film packs.

2.3.4 Dose on Return Flight. The radiation dose on the return flight was measured directly by the P-Meter, Bioscel, and Sigmatron. In each instance all that was necessary was to subtract the dose in the cloud from the total dose. The difference was the dose received on the return flight.

TABLE 2.1 SUMMARY OF SOURCES OF REQUIRED DATA

Data directly available is indicated by x; indirectly available is indicated by O.

Information Desired on Each Flight	P-Meter	Bioscel	Sigmatron	Quartz-fiber Dosimeters	NBS Film Packs	Rad-Safe Film Badge	T1B
Total Radiation Dose	x	x	x	x	x	x	
Time in Cloud	x	x					
Dose in Cloud	x	x	x		O		
Dose on Return Flight	x	x	x				O
Maximum Dose Rate in Cloud	x	x					
Average Dose Rate in Cloud	x	x	x		O		
Dose Rate at Cloud-Exit	x	x					O
Decay Rate on Return Flight	x						O
Contamination Factor	x				O		O

An indirect method of obtaining that portion of the radiation dose received after exit from the cloud and during the return flight was by extrapolation of the decay-rate curve measured by the T1B after the aircraft was on the ground back to cloud-exit time and integration of the area under the curve from cloud-exit time to time of landing.

2.3.5 Maximum Dose Rate in Cloud. The maximum dose rate in the cloud was taken directly from the P-Meter and Bioscel curves. The pilot also observed the maximum dose rate indicated by the Bioscel meter in the cockpit.

2.3.6 Average Dose Rate in Cloud. The average dose rate in the cloud was calculated by dividing the dose received in the cloud by the time in the cloud. Both of these were provided directly by the P-Meter, Bioscel, and Sigmatron. Since the dose in the cloud was obtained indirectly from the NBS film packs, these are also an indirect source for the average dose rate in the cloud.

2.3.7 Dose Rate at Cloud Exit. The dose rate at cloud exit due to contamination on the aircraft was taken directly from the P-Meter and Bioscel curves. It was also derived by extrapolation of the decay-rate curve from the T1B decay measurements.

2.3.8 Decay Rate on Return Flight. The decay rate of the contamination during the return flight was obtained directly from the P-Meter curves. It was also obtained by extrapolation of the decay rate curve from the T1B measurements.

2.3.9 Contamination Factor. The contamination factor is expressed in percent per minute in the cloud and is defined as:

$$\frac{\text{Dose rate in cockpit at cloud exit}}{(\text{Average dose rate in cloud})(\text{Minutes in cloud})} \times 100 \qquad (2.1)$$

It is a measure of the degree to which this type of aircraft (B-57B) becomes contaminated by flight through the cloud as reflected by the radiation dose rate in the crew compartment after exit from the cloud. It is significant in predicting that portion of the total dose which is derived from contamination on the aircraft during the flight back to base. It is calculated directly from data recorded by the P-Meter.

The contamination factor was computed also using the dose rate at cloud exit as derived from T1B measurements and the average dose rate in the cloud indicated by the NBS film packs.

2.4 MASTER DATA SHEET

The large mass of data was summarized on a master data sheet. One of these sheets was filled out for each penetration flight. A typical sheet is shown in Appendix A.

Some additional data on radiation dose rates in the cloud at times later than 1 hour after detonation were obtained through the courtesy of the Test Aircraft Unit. These data were collected during the cloud-sampling operations of this unit.

CHAPTER 3

RESULTS AND DISCUSSION

Twenty-seven penetrations were made through the clouds resulting from the detonation of six weapons ranging in total yield·

These penetrations were made at times of from 20 to 78 minutes after detonation. The indicated altitudes of penetration varied generally from 30,000 feet to 50,000 feet, with one penetration being made at 20,000 feet. Penetrations were made through clouds from land-surface, water-surface, and air detonations.

Maximum dose rates as high as 800 r/hr were encountered in some of the early penetrations, and several flights yielded total radiation doses to the crew of 15 r, as measured by film badges, and 35 to 40 r, as measured by instrumentation more sensitive to soft gamma radiation than the film dosimeters. On other flights, the whole-body radiation dose as measured by Rad-Safe film badges was as low as 100 mr. The dosage authorized by the Surgeon General of the Air Force and the Commander of Joint Task Force Seven for the aircrews on this project was 50 r, with a limiting planning dosage of 25 r for any single penetration. No penetrations were made in which the maximum dose to be expected, as measured by Rad-Safe film badges, would exceed 25 r.

The experimental plan proved to be satisfactory, and data to satisfy the objectives of this project were obtained. The data are presented in Table 3.1 The sections which follow discuss the results as they appear in the table.

3.1 TIME AND ALTITUDE OF PENETRATION

The times of penetration varied as indicated above. The first penetration on each shot was through the stem of the cloud. Succeeding penetrations were at higher altitudes through the intermediate zone between the stem and mushroom or through the mushroom. All penetrations below 40,000 feet were considered to be penetrations of the stem. Penetrations between 40,000 and 45,000 feet were intermediary between the stem and mushroom. Penetrations above 45,000 feet were in general through the mushroom of the cloud.

3.2 LENGTH OF TIME IN THE RADIOACTIVE CLOUD

The length of time in the cloud recorded in Table 3.1 represents the period of time from the moment the radiation intensity reached a value of 5 percent of the maximum intensity noted in the cloud until the intensity subsequently diminished to this 5 percent value. In penetrations of the stem or mushroom, this time corresponds closely to the time in the visible cloud reported by the pilot. However, in penetrations just below the altitude of the mushroom, the length of time in the radiation field was usually longer than that in the visible cloud by a factor comparable to the time the plane was beneath the overhanging mushroom but was not in the visible cloud. The length of time in the radiation field is used in Table 3.1, since the dimensions of the radiation field are of greater interest in this report than the dimensions of the visible cloud. The time required to pass through the radiation cloud varied from 1 minute for stem penetrations to about 5 minutes for the mushroom penetrations of the clouds from the higher-yield detonations. More-detailed information on cloud size as a function of time after detonation, yield of detonation, and altitude are presented in a later section of this report.

3.3 RADIATION DOSE RATES IN THE CLOUD

The maximum and average radiation dose rates recorded for each penetration by the various instruments previously described are given in Table 3.1. The maximum dose rate recorded on each flight through the cloud was about twice the average dose rate recorded for the total period in the cloud by the same instrument. The average dose rates in the cloud recorded by the P-Meter and Bioscel were generally 100 percent and 15 percent, respectively, higher than that determined by film dosimetry. This is due to the sensitivity of this electronic instrumentation to low-energy gamma radiation to which the film is only minimally responsive. Since film dosimetry is more widely accepted as an indicator of whole-body radiation dosage, the film data were used to give dose rates or dosages in all figures and tables presented in this report, unless otherwise specified.

A further study will be made to determine the exact response of the various instruments to various energies of gamma radiation in comparison to the response of the film to the same energies. Detailed results of this study will be included in the final (WT) report for this project.

Appendix B shows a typical plot of the dose rates in the cloud recorded by the P-Meter and Bioscel, together with data which were extracted therefrom for presentation in Table 3.1.

The radiation dose rates observed in the cloud were a function of three primary factors: (1) the nature of the yield of the detonation, i.e., the ratio of the fission yield to the total yield; (2) the altitude at which the penetration is made with respect to the position or height of the mushroom; and (3) the length of time after detonation at which the penetration is made.

3.3.1 Radiation Dose Rates in the Cloud versus Nature of the Yield. Since fission yield is the primary contributor to radioactivity prevailing in the cloud, it is to be expected that the dose rates noted in the cloud would be proportional to the ratio of the fission yield to the total yield. Thus, if two separate detonations of essentially the

3.4 RADIATION DOSES

The total gamma-radiation dose received on a penetration flight can be broken down into two parts: the dose received in the cloud and the dose received on the return flight. The return flight dose for the B-57B was found to be approximately 15 percent of the total dose when the return flight was of about 50 minutes duration. Section 2.3 of this report explains the various direct and indirect methods used to measure the dosage received by the crew, both in the cloud and on the return flight. Data collected by these various methods is presented in TABLE 3.1.

The maximum total dose received by any crew member during a penetration flight associated with this project was approximately 16 r, as measured by film dosimetry. Doses as high as 40 r were recorded by instruments more sensitive to soft gamma radiation than film dosimetry. It is significant to note that the highest radiation doses received do not correspond to the earliest penetrations. The dose received in the cloud is a function of the average dose rate in the cloud and the time spent in the cloud. For each shot the first penetration usually was made at the lowest altitude, and succeeding penetrations were made at higher altitudes.

This plan was followed so that in the event turbulence was encountered, it could be tolerated better at the lower altitude. Thus the earliest penetrations were made through the stem of the cloud. Since the dose rate in the stem was lower than the dose rate in the mushroom at the same time after detonation and since the diameter of the stem was a third to a half of that of the mushroom, lower dosages were received by the crews who made the earlier penetrations of the stem of the cloud than by those crews who made later penetrations of the mushroom. This was true for all shots.

3.6 CONTAMINATION FACTOR

The contamination factor was defined and discussed in Section 2.3.9. Values given in Table 3.1 are from computations made using each of the methods of calculations which were described. The average contamination factor for B-57B aircraft is 0.6 ± 0.2 percent per minute. Both methods of calculation gave about the same value. With a contamination factor of this magnitude, a return to base flight of several hours duration after an early penetration of a radioactive cloud would result in a radiation dose to the crew, during the return flight, of about 25 percent of the total dose.

The contamination factor for any particular type of aircraft is a function of the distance between the crew compartment and the residual contamination on the aircraft. In general, the engines are the most-highly contaminated portion of the aircraft after flight through a radioactive cloud. Project 2.8 of Operation TEAPOT measured contamination factors on several different types of aircraft and concluded the contamination factor to be higher for those aircraft where the crew compartment was close to the engine or engines.

3.9 EFFECTIVENESS OF INSTRUMENTATION

Not all of the instrumentation installed in the aircraft operated satisfactorily on every flight. However, in no case did an aircraft penetrate the cloud without sufficient instrumentation functioning properly to provide the necessary data to satisfy the objectives of this project. Film methods were 100 percent successful in measuring the total dose received by the aircrew on the mission. The photopanel functioned on every penetration, with good pictures resulting from each instrument. On one penetration the pilot set the camera speed on the "slow" position, resulting in one picture every 20 seconds while in the cloud, instead of the desired rate of three pictures per second.

The automatic recording instruments were designed to measure radiation rates up to 2,000 r/hr. On penetrations where the dose rates were quite low, continuous data were not obtained on the return flight. In these cases the total mission dose was always less than 2 r. The P-Meter failed to function on only two of the flights. Thus satisfactory operation of this instrument was obtained in more than 90 percent of the flights. On the two occasions where the P-Meter failed to function, the fault was in the method of installation and not in the instrument itself.

Some trouble was experienced with the Bioscel and Sigmatron. Both of these instruments were battery powered. Even with frequent checks of the battery voltages, satisfactory performance was obtained only about 75 percent of the time. Zero drift was especially troublesome in the Bioscel, leading to poor results at low dose rates. The Sigmatron was designed to measure up to 25 r on the low range. Total dosages smaller than 1 r were not reliably indicated by this instrument.

Film measurements were considered to be accurate to ± 10 percent. Measurements made with the T1B were considered accurate to ± 10 percent. The P-Meter, Bioscel, and Sigmatron were considered to give an accuracy of ± 20 percent. As mentioned in Section 3.3, the P-Meter gave readings about a factor of two higher than film devices. Greater sensitivity and response of the P-Meter to gamma radiation of low energies appears to be the reason for this discrepancy. On the average, the Bioscel and Sigmatron read 15 percent and 25 percent higher respectively than did the film dosimeters.

The flight instruments installed in the photopanel functioned properly on each flight. Indicated altitudes were considered to be correct to ± 500 feet. Times of penetration were accurate to the nearest minute.

The accelerometer installed in the photopanel was not considered to be reliable in giving indications of turbulence in flight. The maximum and minimum needles vibrated to the limit of their movement on takeoff. Photographic records were available of the meter fluctuations within the cloud but could not be correlated with the verbal reports of the pilots concerning conditions of flight within the cloud.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

Twenty-seven penetrations of six radioactive clouds from multimegaton-yield detonations were made at times ranging from 20 to 78 minutes after detonation and at altitudes ranging from 20,000 to 50,000 feet. Sixteen of these penetrations were earlier than 45 minutes after detonation, and seven were earlier than 30 minutes. All penetrations made earlier than 45 minutes were bore-throughs in which the aircraft completely traversed the cloud from one side to the other at the penetrating altitude. Penetrations were made through clouds from air, land-surface, and water-surface detonations. Maximum dose rates as high as 800 r/hr were encountered in some of the early penetrations, and several flights yielded total radiation doses to the crew of 15 r (measured by film badges) and 35 to 40 r (measured by instrumentation more sensitive to soft radiation).

Data collected on these flights and in conjunction with past studies of conditions prevailing within clouds from nuclear detonations warrant a number of conclusions regarding the feasibility of flying through such clouds at relatively early times after detonation:

The average and maximum external gamma-radiation dose rates in the mushroom of the cloud from nuclear detonations are dependent on the penetration time and the fission-to-total-yield ratio of the detonation and are independent of the yield of the detonation. The average radiation dose rate in the mushroom of the cloud from a 100-percent-fission-yield detonation as a function of time from 3 to 80 minutes after detonation is given by the equation:

$$\bar{D} = 1.0 \times 10^5 t^{-1.7} \qquad (4.1)$$

Where: $\bar{D}$ = Average dose rate, r/hr.
t = Time after detonation, minutes.

This average dose rate, $\bar{D}$, may vary by as much as a factor of two for any given penetration.

Beyond 1 hour after detonation, when the mushroom begins to be dispersed by the winds, a more-rapid decay of the radiation dose rate in the cloud is noted in which the slope may be as great as -3 or -4.

The radiation dose rate in the stem beneath the mushroom of clouds from water-surface or air detonations is less by a factor of five to ten than in the mushroom itself.

In clouds from detonations in which the fission yield is less than 100 percent of the total yield, the radiation dose rate is reduced by a factor proportional to the ratio of the fission yield to the total yield.

The accumulated radiation dose that one receives in transit through the cloud is a function of two primary factors: (1) the radiation dose rate in the cloud (related to time after detonation, to the ratio of the fission yield to the total yield, and to the portion of the cloud through which transit is made, i.e., stem or mushroom); and (2) the length of time spent within the cloud as determined by the speed of the aircraft and the horizontal dimension of the cloud at the altitude of penetration. The diameters of the stem and mushroom increase somewhat with greater yields.

Considering all these factors, two generalizations, substantiated by the penetrations actually flown, may be made: (1) with the tropopause at 55,000 feet, one may fly through the cloud from any yield for a 100-percent-fission weapon in a high-performance aircraft at an altitude of 45,000 feet at 20 minutes after detonation for an expected radiation dose of 25 r; (2) with the same height tropopause, one may fly through the cloud (stem) from any 100-percent-fission weapon at 30,000 feet as early as 10 minutes after detonation for a radiation dose of the same magnitude.

Moderate to severe bumpy turbulence was encountered in one of the clouds penetrated at times of 22 to 40 minutes after detonation. Slight to no turbulence was encountered in the other clouds penetrated during a similar time range. Turbulence was not a problem in any of these penetrations, and it was considered not likely to be a serious problem in a penetration as early as 10 minutes after detonation.

Icing was encountered in some of the penetrations, but caused no difficulty, except in the case of two aircraft penetrating a cloud from a water-surface detonation at the maximum altitude of 50,000 feet. This icing forced the pilots of these aircraft to reduce power on the jet engines in order to avoid overheating.

The contamination factor on the B-57B aircraft, as defined herein, averaged 0.6 ± 0.2 percent per minute in penetrations of clouds from air, land-surface, and water-surface detonations. This factor enables one to estimate that portion of the total dose received which is accrued during the flight back to base after exit from the radioactive cloud. In the penetrations made for this project, the return flight took about 50 minutes, and the come-home dose averaged about 15 percent of the total. On return flights of 2 to 3 hours duration in this aircraft the come-home dose would be no more than 25 percent of the total dose for early penetrations of the cloud.

4.2 RECOMMENDATIONS

There are no recommendations at this time.

REFERENCES

6. Landahl, H. D.; Calculations of the Hazard Involved in Passag through a Radioactive Cloud Resulting from a Nominal Atomic Bomb; Quarterly Progress Report No. 1, October 1951, USAF Radiation Laborato University of Chicago, Chicago, Illinois; OFFICIAL USE ONLY.

STATEMENT OF JOHN F. SOMMER, JR., DEPUTY DIRECTOR
NATIONAL VETERANS AFFAIRS AND REHABILITATION COMMISSION
THE AMERICAN LEGION
TO THE COMMITTEE ON VETERANS AFFAIRS
UNITED STATES SENATE
NOVEMBER 14, 1985

Mr. Chairman and Members of the Committee:

The American Legion appreciates this opportunity to present its views on the problems that are being incurred by veterans exposed to ionizing radiation while serving on active duty in the US Armed Forces, and to comment on other issues of importance to the Atomic Veterans.

Veterans who were exposed to ionizing radiation during their participation in nuclear weapons testing while serving on active military duty, or during service with the occupation forces in Hiroshima and Nagasaki following World War II, continue to find it exceedingly difficult to receive favorable determinations on their disability compensation claims from the Veterans Administration. Figures illustrating the high percentage of denials by VA in radiation exposure cases will be discussed later in this statement.

Mr. Chairman, as you well know, Public Law 98-542, the "Veterans Dioxin and Radiation Exposure Compensation Standards Act" was enacted on October 24, 1984. The stated purpose of the act is to ensure that Veterans Administration disability compensation is provided to veterans who were exposed during service in the Armed Forces in the Republic of Vietnam to a herbicide containing dioxin, or to ionizing radiation in connection with atmospheric nuclear tests or in connection with the American occupation of Hiroshima or Nagasaki, Japan, for all disabilities arising after such service that are connected, based on sound scientific and medical evidence, to such service (and that Veterans Administration dependency and indemnity compensation is provided to survivors of such veterans for all deaths resulting from such disabilities).

Although this law does not address all of the concerns that have been set forth by The American Legion over the past several years with respect to radiation and dioxin exposure, it was felt to be at least a step in the right direction and we have anxiously awaited the publication by VA of rules to implement the Act. The final regulations were published in the Federal Register on August 26, 1985. The American Legion is not in agreement with a number of the rules, and addressed each of its concerns, in detail, in written comments that were submitted to the Veterans Administration during the public comment period. However, a number of the final regulations continue to be of concern to us.

The first concern that we feel bears mention at this time pertains to the rules that, as provided under section 5 of the law, are to specify whether, and if so under what circumstances, certain diseases are to be recognized as connected to a veteran's exposure to radiation. According to PL 98-542, the diseases for which rules must be issued are leukemias, polycythemia vera, and malignancies of the thyroid, female breast, lung, bone, liver and skin.

The Veterans Administration has determined that polycythemia vera is not a radiogenic disease for the purpose of this law. This arbitrary decision was based on an assumption that sound scientific and medical evidence does not establish a connection between polycythemia vera and radiation exposure.

Amazingly, in attempting to justify this decision, the only scientific study cited (Polycythemia Vera Among Participants of a Nuclear Weapons Test, Glyn G. Caldwell, MD, et al., JAMA, Vol 252, pp. 662-664 (1984)), found a significantly greater than expected occurrence of polycythemia vera among 3,217 nuclear test participants present at the "Smoky" atmospheric nuclear test. The VA states, "However, the lack of supporting documentation suggests the apparent excess of polycythemia vera cases may have resulted from chance or misdiagnosis."

In reviewing the results of this study we find that only 0.2 cases would be expected in a population of this size, yet 4 were observed. Although these findings are statistically significant, VA has chosen not to accept them, has attempted to explain them away, and has not cited any evidence that shows that polycythemia vera is not caused by radiation exposure. To The American Legion, decisions made by VA in this manner with respect to what conditions service connection based on radiation exposure may be established are not acceptable.

A new regulation under 38, CFR, 3.311b, sets forth the rules for claims based on ionizing radiation, including those pertaining to requests for dose information. As a result of these regulations, the Veterans Administration has notified the Defense Nuclear Agency that any case not involving one of the 15 diseases listed in the regulations, as determined by VA to be a "radiogenic disease", is considered closed. VA has notified the Defense Nuclear Agency of this decision. Thus, DNA has instructed the Nuclear Test Personnel Review teams of the various branches of the Armed Forces to return all requests for dose reconstruction for illnesses other than the 15 to the VA regional office that submitted the request, along with a copy of the Federal Register entry and a statement that according to VA rules, the case is not considered radiation related. The NTPR teams have been instructed not to calculate or reconstruct radiation exposures for VA on "non-radiogenic illnesses."

The rule is considered to be retroactive, and VA has notified DNA that all previous claims not involving radiogenic illnesses are considered closed.

In addition, the regulations establish a 30 year presumptive period for leukemia and bone cancer. The NTPR teams have been instructed to provide dose information only on those cases where these two diseases became manifest within 30 years of the veteran's participation in a nuclear weapons test, in accordance with the VA regulations.

It appears to us that this blatant refusal on the part of the VA to fully develop claims that do not meet criteria that was established by that agency, is a denial of the claimant's due process, and that these particular regulations should be amended to state that dose information shall be provided in any case where there is a diagnosed disease or disability.

Mr. Chairman, various estimates have been made regarding the total number of veterans exposed to radiation, ranging from 220,000 to 350,000. Regardless of the exact figure, we are speaking of a significant number of veterans that were present during nuclear weapons tests during the period 1945-1962. Many have subsequently developed leukemia and other similar diseases that may be linked to their radiation exposure.

As previously mentioned, The American Legion has found it exceedingly difficult to obtain favorable action on claims to VA for service-connected compensation based upon disabilities felt to be caused by radiation. Available figures show that as of September 3, 1985 a total of 5,194 radiation exposure claims had been evaluated by the Department of Veterans Benefits, and of those 3,083 related to a diagnosed condition. In 79 of these cases service connection has been granted for the claimed condition. Atomic testing exposure was claimed in 3,050 of the cases, 1,886 of which contained a diagnosis. A total of 15 atomic weapons testing cases had been allowed as of September 3. As for the allowance rate, 2.6 percent of the total cases involving a diagnosed condition have received favorable decisions, and only 0.5 percent of the atomic test related claims have been allowed.

For the purpose of comparison, we reviewed earlier figures that were included in American Legion testimony on this issue. As of March 1, 1983 service connection had been granted in 69 total radiation cases, and 14 of them were atomic weapons testing cases. What this means is that in over two years, only ten additional cases have been allowed, and of the ten, only one was an atomic testing case. This is further evidence of the Veterans Administration's reluctance to demonstrate any degree of flexibility when considering the evidence in radiation claims.

These problems led the Delegates to our 1984 National Convention to approve Resolution No. 529 (copy attached) which sets forth The American Legion Policy on Radiation Exposure Cases.

Mr. Chairman, one of the most frequent problems that we encounter in representing veterans with their radiation exposure claims is the amount of exposure that must be demonstrated before VA will allow a claim. There is a wide difference of opinion among the scientific community as to how much radiation is dangerous. However, the Veterans Administration is holding fast to the theory that any exposure under 5 REM is not harmful.

This problem is compounded by the fact that actual exposure measurements do not exist for the majority of veterans who were involved in atomic weapons testing. Because of missing data including film badges in many instances, the Defense Nuclear Agency established the Nuclear Test Personnel Review (NTPR) program in each military service to conduct research in order to retrieve data necessary to reconstruct dose levels for individual veterans. We are most familiar with the work accomplished by the Army NTPR program, and appreciate the tremendous amount of time and effort that have gone into their development of test histories and dose reconstruction.

However, in many instances the dose reconstruction is based on methodology and assumptions because film badges are scarce to nonexistent.

Film badging was originally the responsibility of The Atomic Energy Commission and the Armed Forces Special Weapons Program. However, in 1953 the Army assumed this responsibility and began issuing and processing the film badges for Army participants in the Desert Rock exercises.

During the first shot of the 1953 test series at the Nevada Test Site every participant was issued a badge. However, this was felt to be excessive, so badging was subsequently done by platoon, with the platoon leader receiving a film badge, and each member of that platoon being assigned the dose level received by the platoon leader. Following each exercise the badges were collected, read by a processing facility, and rosters were prepared, assigning, by platoon, a dose level to each participant. The rosters were then submitted to the Camp Desert Rock surgeon to determine whether or not any of the participants were overexposed.

Although five copies of each roster were made, all copies for every shot tested in 1953 and 1955 have somehow disappeared. An extensive search has been conducted during the past seven years, but the NTPR community has not been able to locate the rosters. Without them, a difficulty exists in placing the Army support troops at Camp Desert Rock during a specific shot, based on dates of assignment to the Nevada Test Site. Through the use of morning reports it may be determined whether a veteran was located at Desert Rock for the full period in which testing was being accomplished, or for a partial period. However, it is impossible to determine how many or what specific tests each veteran participated in, thus an estimated dose level, which may or may not be correct, must be assigned to each participant.

Mr. Chairman, because these veterans served under especially unusual and potentially hazardous conditions, The American Legion supports the enactment of H.R. 1338, a bill that seeks to restore a legal course of action previously available to Atomic Veterans. This measure would allow those individuals assigned to atomic weapons testing sites while on active duty to sue for damages resulting from inadequate precautionary measures taken by defense contractors while conducting the weapons tests. This would be accomplished by removing the legal obstacle created last year by an amendment to the Fiscal Year 1985 Defense Authorization Act, PL 98-525, which stripped these veterans of their only legal recourse.

The amendment that was added to the legislation by the Senate, substitutes the United States government for the names of contractors being sued in class actions. In making this substitution, as previously mentioned, veterans engaged in these suits have been effectively denied any legal avenue of redress. This is because the Feres Doctrine allows the United States government to escape liability for injuries sustained by active duty military personnel. Had the defense authorization amendment failed, veterans alleging radiation exposure injury could have continued pursuit of their claims by suing the federal contractors thought to have been negligent in taking the necessary and available safety precautions to minimize the risk of injury. In that regard, many if not most of the contracts let by the government to private contractors involved in the weapons testing program contained indemnity clauses making the federal government financially responsible for any mishaps. While these contractors were still obligated to bear the costs associated with defending against these suits, if a judgement favoring the veterans was rendered the government would be obliged to pay.

In this instance, the government's support of the amendment denying veterans access to the courts constitutes a cavalier disrespect for, and insensitivity to, its obligations under contracts entered into freely. In the spirit of fair play, The American Legion supports H.R. 1338 and strongly urges the Senate to pass the measure, or similar Senate legislation, at the earliest possible time. We expect that the bill will be passed by the House in the near future.

After having said that, we are compelled to express an appreciation for the principle in the Feres Doctrine holding that the federal government should be free from liability for injury to service personnel given the special hazardous nature of defending America's national interests by use of arms. Clearly, the nation has an obligation to provide for its defense and in doing so it is unfortunately necessary to order military personnel to dangerous duty.

We also want to make it clear that The American Legion has no view to express relating to the merits of any suit that might be reopened or newly brought if this legislation is enacted. What genuinely concerns us is the issue of equity and fairness. If contractors were negligent in failing to provide the best possible safety procedures available at the time of these tests, the principles associated with the special nature of military service should not apply. Just because military personnel are subject to the orders of their superiors is no good reason to expose these men and women to avoidable risks, particularly during peacetime.

Under this legislation, one further change would be made that ought to make the proposal more acceptable to the contractors who might be named in a suit. In substituting the federal government for the name of the contractor, it is our understanding that those contractors would be free of the financial obligations associated with court defense. Instead, the federal government would be required to join the legal contest.

Moreover, from a public policy standpoint this legislation may serve to encourage the federal government to more closely oversee contractor operations in the interest of providing adequate safety for the men and women of the armed services. It may be, in that regard, that future federal contracts will no longer contain indemnity clauses. Should this be the case, contractors themselves may be given an incentive to take care in attending to safety procedures.

As stated earlier, The American Legion's support for H.R. 1338 is motivated by a desire to reinstate a degree of fairness and equity for the Atomic Veterans.

Our next area of concern relates to the latest guidelines issued by the Department of Medicine and Surgery on the provision of health care, authorized under PL 97-72, to veterans exposed to ionizing radiation while on active military duty. DM&S Circular 10-85-83 dated May 28, 1985, directs VA medical centers and outpatient clinics to verify each veteran's service at the site of nuclear device testing or in Hiroshima and Nagasaki, by submitting specific information about the veteran to the Army, Navy, Marine Corps or Air Force Nuclear Test Personnel Review program. The circular does go on to state that in the absence of documented evidence to the contrary, a veteran's assertion of exposure at a nuclear device testing site or in Hiroshima/Nagasaki, will be accepted.

The American Legion is concerned about what happens to these veterans, particularly those who are seriously ill, while the medical facility is awaiting the verification of exposure. The NTPR program is attempting to give priority status to such requests. However, in many instances they do not have the proper records on which to make an immediate decision, and it can take six weeks or longer for an intensive search for such records. In some cases it has taken over a year. Meanwhile, what is the sick veteran supposed to do?

One alternative that would seem sensible to us, if this verification is indeed necessary, is to first determine whether or not the veteran has filed a claim for a service-connected disability based on radiation exposure, and to coordinate with the VA regional office to see if the verification of exposure is already of record in the veteran's claims folder. This would be much faster than first going to the NTPR, and it would also eliminate a duplication of effort on the part of the NTPR.

DM&S Circular 10-85-83 also goes into great detail as to how a responsible staff physician shall make a determination on whether or not the condition for which a veteran seeks treatment resulted from a cause other than exposure to ionizing radiation.

Section 102 of PL 97-72 states that a veterans who the Administrator finds was exposed to ionizing radiation while serving on active duty may be furnished hospital or nursing home care "for any disability notwithstanding that there is insufficient medical evidence to conclude that such disability may be associated with such exposure." Therefore, The American Legion disagrees with the need for the extensive language contained in the circular for the purpose of ruling out eligibility should the examining physician find a veteran has "a condition not ordinarily considered to be due to the specified exposure and that there are not complicating circumstances warranting the provision of care under this authority."

We have often made known the fact that we have considered the guidelines to be too restrictive since they were first published and implemented subsequent to the enactment of PL 97-72. DM&S Circular 10-83-61 dated April 5, 1983, contained some improvements in the original guidelines. However, because of the Legion's firm belief that the criteria for VA medical treatment provided radiation exposed veterans should be further liberalized, the Delegates to the 1984 National Convention approved Resolution No. 530 (copy attached) The resolution mandates The American Legion to urge the Veterans Administration to provide medical care authorized under PL 97-72, to any honorably discharged veteran who was exposed to ionizing radiation during active military service, and who has incurred a disability or disabilities other than those diagnosed as a congenital or developmental abnormality, or an acute condition that is obviously not related to radiation exposure (e.g. acute appendicitis or a broken bone).

Mr. Chairman, there is also much that needs to be done in the way of research, particularly follow-up studies, on the issue of radiation exposure and its effects on veterans. Very little meaningful research has been accomplished to date, and the studies that have been completed almost all include a disclaimer that although there is a statistically significant finding, there is no proof that the increased incidence of the particular disease or diseases is related to radiation exposure.

The latest example of this was illustrated in a report entitled "Mortality of Nuclear Weapons Test Participants" issued by the National Academy of Sciences - National Research Council, on June 4, 1985. This study looked at 46,000 veterans who participated in five different test series between 1951 and 1957. The results of this study confirmed the findings of an earlier study that showed an increased incidence of leukemia among the veterans that participated in the shot "Smoky", and also found an increased incidence of prostate cancers in those veterans who participated in the shot "Redwing".

However, the report states, "The total body of evidence we have reviewed cannot convincingly either affirm or deny that the higher than statistically expected incidence of leukemia among Smoky participants (or of prostate cancer among Redwing participants) is the result of radiation exposure incident to the tests."

We would like to know if exposure to radiation from the tests did not cause the increases in leukemia and prostate cancer then what did? To The American Legion, such conclusions express a valid requirement for additional, viable research.

It would also appear there is a need to consolidate the available information on the effects of low level radiation on veterans and to focus additional attention on the subject.

There is clearly a need for action to be taken, and The American Legion urges the Congress to study this matter, keeping in mind the plight of the veterans involved and the frustrations they face in attempting to secure benefits for and treatment of their disabilities.

Mr. Chairman, that concludes our statement.

Attachments:

Resolution No. 529, 1984 National Convention
Resolution No. 530, 1984 National Convention

SIXTY-SIXTH ANNUAL NATIONAL CONVENTION OF THE AMERICAN LEGION
SALT LAKE CITY, UTAH, SEPTEMBER 3, 4, 5, 1984

RESOLUTION: No. 529 (Iowa)

COMMITTEE: Veterans Affairs and Rehabilitation

SUBJECT: The American Legion Policy on Radiation Exposure Cases

WHEREAS, during the period 1945-1962, according to the Department of Energy, there were approximately 200 atmospheric nuclear weapon tests in the U.S. and the Pacific, which involved approximately 347,000 persons, most being active duty service personnel; and

WHEREAS, it has come to public attention that a significant number of veterans who were present at these tests have subsequently developed leukemia, thyroid conditions, and other similar diseases which, based on scientific evidence, are linked to their exposure to radiation in service; and

WHEREAS, several agencies, including the Department of Energy, Department of Defense, and a civilian contractor funded by the Federal Government, have access to information, records, and dosimetry files pertaining to the nuclear weapon tests, including individual exposure histories of participants; and

WHEREAS, heretofore it has been virtually impossible to properly develop radiation related claims as a result of the reluctance of some agencies to relinquish information to individual claimants and accredited representatives, and the fact that VA regional office personnel have not been adequately instructed in the preparation of these cases; and

WHEREAS, the Department of Veterans Benefits, VA Central Office, is hesitant to demonstrate any degree of flexibility when considering the evidence of record in radiation claims, which lends even more significance to the importance of proper development; and

WHEREAS, The American Legion is actively involved in locating veterans who participated in any atomic tests while on active duty, assisting such veterans in the filing and development of appropriate claims for benefits under laws administered by the Veterans Administration, and advising them of possible eligibility for treatment at Veterans Administration medical care facilities; now, therefore, be it

RESOLVED, by The American Legion in National Convention assembled in Salt Lake City, Utah, September 3, 4, 5, 1984, that The American Legion urge the Executive Branch, including the Secretary of Defense, and the Secretary of Energy to ensure the cooperation of their respective agencies in making available all existing records and information pertaining to atmospheric nuclear weapon tests to the Veterans Administration; and, be it further

RESOLVED, that The American Legion urge the Administrator of Veterans Affairs to promulgate regulations and issue additional specific guidelines and instructions to all regional offices necessary for the proper development and adjudication of claims involving disabilities resulting from exposure to radiation; and, be it finally

RESOLVED, that The American Legion support legislation to amend title 38, United States Code, to establish a mechanism for presumption of service-connection for certain disabilities traced to radiation exposure once such presumption is justified by scientific evidence.

SIXTY-SIXTH ANNUAL NATIONAL CONVENTION OF THE AMERICAN LEGION
SALT LAKE CITY, UTAH, SEPTEMBER 3, 4, 5, 1984

RESOLUTION: No. 530 (Iowa)

COMMITTEE: Veterans Affairs and Rehabilitation

SUBJECT: Urges that radiation exposure cases be entitled to medical treatment on a presumptive basis

WHEREAS, Public Law 97-72 provides that veterans exposed to radiation during active duty may be furnished hospital or nursing home care for any disability, notwithstanding that there is insufficient medical evidence to conclude that such disability may be associated with such exposure; and

WHEREAS, the provision of such health care services has been limited primarily to veterans suffering from cancer or thyroid nodules; and

WHEREAS, The American Legion firmly believes that the criteria for VA medical treatment provided radiation exposed veterans should be liberalized to include treatment for all diseases except congenital or developmental abnormalities and acute conditions that are obviously not caused by such exposure; now, therefore, be it

RESOLVED, by The American Legion in National Convention assembled in Salt Lake City, Utah, September 3, 4, 5, 1984, that The American Legion urge the Veterans Administration to provide medical care authorized under PL 97-72, to any honorably discharged veteran who was exposed to ionizing radiation during active military service, and who has incurred a disability or disabilities other than those diagnosed as a congenital or developmental abnormality, or an acute condition that is obviously not related to radiation exposure.

WRITTEN QUESTIONS FROM SENATOR CRANSTON TO THE VETERANS' ADMINISTRATION AND THE RESPONSES

Question #1: On page 7 of your written testimony, you stated that "the VA has established service connection in twenty-three claims involving allegations of radiation exposure during participation in atomic weapons testing, where disability arose after discharge from service and expiration of any applicable post-service presumptive period." However, in 1984, the VA advised me in response to questions I asked in connection with floor considerations of S. 1651/H.R. 1961 that a total of thirty claims for service connection based on exposure to radiation in the atomic test program had been allowed. (See Cong Rec., May 22, 1984, page S6147, October 4, 1984, page S12597.) Please explain the discrepancy between these two figures.

Answer: Both of the figures in question represent combinations of statistics from DVB and BVA, but the 1984 figure of 30 allowed claims apparently combined two dissimilar statistics. At the time of that report DVB indicated that 14 claims alleging exposure to ionizing radiation during nuclear testing had been allowed. While that figure was correct as stated, it included radiation claims that were allowed on a basis other than a direct cause and effect relationship between in-service radiation exposure and the subsequent manifestation of a disability many years later. The BVA's 1984 report of 16 allowed claims for nuclear test participants included, on the other hand, only those claims where the allowance was based on ionizing radiation being the direct cause of the claimed disability. In contrast, our recent testimony that 23 claims had been allowed was based on a combination of DVB and BVA statistics which used the same selection criteria, i.e., claims allowed solely on the basis that ionizing radiation in-service was the cause of a disability that arose after discharge from service and after the expiration of any applicable post-service presumptive period. Using that selection criteria DVB now reports that 6 claims from nuclear test participants have been allowed based on a direct relationship between in-service radiation exposure and the claimed disability. For BVA that figure is now 17.

Question #2A: What is the total number of nuclear test-related claims filed to date?

Answer: The statistics currently available are based on tally sheets that have been manually updated since early 1978 on the basis of rating decisions forwarded to VA Central Office for review. The last such report shows that as of September 3, 1985, a total of 3050 claims had been filed alleging exposure to ionizing radiation during nuclear test participation. In order to modernize our data collection efforts we have developed a computer system that allows direct data entry by regional office personnel of information pertinent to radiation-related claims. We are in the process of developing recurring reports on radiation claims that can be generated automatically, and we believe such reports will improve the accuracy of our statistical data by eliminating any duplication of records that may have occurred under the previous manual system.

Question #2B: How many of these claims are for malignancies?

Answer: Available statistics indicate that of the 3050 claims from nuclear test participants 1144 involved malignancies.

Question #2C: On page 8 of your written testimony, you indicate that 38% of nuclear test-related claims involved no diagnosed illness. During the hearing itself, Mr. Vogel used the figure 41% in explaining the same point. Please clarify this discrepancy by providing both a total number and a percentage for total VA radiation-based claims to date involving no diagnosed illnesses made by participants in the nuclear weapons test program (NWTP) or the occupation of Japan immediately after the war.

Answer: To clarify the percentages quoted from testimony, the total number of claims based on radiation exposure from any source (nuclear test, occupation forces, therapeutic, occupational or other) as of September 3, 1985, was 5194. Of that figure, 2111 or 41% (rounded up from 40.6%) involved no diagnosed illness. Of the 3050 claims based on radiation exposure due to nuclear test participation, 1164 or 38% (rounded down from 38.2%) involved no diagnosed illness. In answer to the present question, 3050 claims were based on nuclear test exposure and 825 claims were based on occupation forces exposure for a total of 3875. Of that total 1339 (1164 nuclear test plus 175 occupation forces) or 35% (rounded up from 34.5%) involved no diagnosed illness.

Question #2D: What is the total number of claims, filed by NWTP participants and former Japan occupation troops, that were allowed on the basis of radiation-induced disability and how many involved malignancies; please break these allowed claims down by disease categories and in terms of those granted by BVA and those by DVB.

Answer: The total number of claims filed by nuclear test participants or occupation troops that were allowed on the basis of radiation-induced disability, i.e., the condition was not diagnosed in service or during any applicable presumptive period, is 23. None of the allowed claims were filed by occupation forces. Of the 6 claims allowed by DVB, 4 were malignancies. By disease category the 6 claims allowed by DVB included 2 non-malignant skin conditions, 2 leukemias, 1 malignant lymphoma, and 1 basal cell carcinoma. Of the 17 claims allowed by BVA, 14 were malignancies. By disease category the 17 claims allowed by BVA included 10 leukemias, 2 basal cell carcinomas, 1 lung cancer, 1 malignant reticuloendothelial process, 2 thyroid disorders and 1 cataract.

QUESTION: 3) ALSO ON PAGE 7, YOUR TESTIMONY INDICATES THAT, PURSUANT TO PUBLIC LAW 97-72, OVER "5,500 INPATIENT ADMISSIONS AND 10,000 OUTPATIENT VISITS TO VA MEDICAL FACILITIES FOR CONDITIONS WHICH CANNOT BE DISASSOCIATED FROM RADIATION EXPOSURE HAVE OCCURRED".

A. PLEASE PROVIDE COPIES OF THE FORM USED TO COLLECT THIS INFORMATION FROM FIELD STATIONS.

ANSWER: PERTINENT FORMS ARE ENCLOSED.

SUPPLEMENTARY INSTRUCTIONS FOR PREPARATION OF VA FORMS 10-2875-1 AND 10-2875-2 FOR SPECIAL SURVEY OF VETERANS RELATING TO EXPOSURE

1. PURPOSE: To provide additional instructions for preparing VA Forms 10-2875-1 and 10-2875-2 to obtain additional information on medical care provided to veterans alleging exposure to Agent Orange in Vietnam or to ionizing radiation in Hiroshima or Nagasaki or in nuclear tests. This information is needed for a recurring report to Congress (RCS 10-0582).

2. INSTRUCTIONS

a. For all VA Forms 10-2875-1 or 10-2875-2 prepared for veterans with VETERAN ELIGIBILITY codes 1 through 5. The SPECIAL SURVEYS SECTION is to be completed as follows:

IN BLOCK 1

0—No claim of service in Vietnam

1—Claims service in Vietnam

IN BLOCK 2

0—No claim of exposure to Agent Orange

1—Claims exposure to Agent Orange

IN BLOCK 3

0—No claim of exposure to ionizing radiation

1—Claims exposure to ionizing radiation in Hiroshima or Nagasaki

2—Claims exposure to ionizing radiation in nuclear testing

b. For all VA Forms 10-2875-1 or 10-2875-2 prepared for veterans receiving 10-10 examinations (code 2 in PURPOSE OF VISIT), when there is an entry other than "0" in BLOCKS 1 through 3 in the SPECIAL SURVEYS SECTION, indicate disposition in that section according to the following instructions:

IN BLOCK 5

0—Medical care not required.

1—Admission for hospital, nursing home or domiciliary care for a condition possibly related to exposure to Agent Orange in Vietnam.

2—Admission for hospital, nursing home or domiciliary care for a condition possibly related to exposure to ionizing radiation in Hiroshima or Nagasaki.

3—Admission for hospital, nursing home or domiciliary care for a condition possibly related to exposure to ionizing radiation in nuclear testing.

4—Admission to an outpatient program (PBC; OPT-SC; OPT-A&A; OPC-AHC; etc.) for a condition possibly related to exposure to Agent Orange in Vietnam.

5—Admission to an outpatient program for a condition possibly related to exposure to ionizing radiation in Hiroshima or Nagasaki.

6—Admission to an outpatient program for a condition possibly related to exposure to ionizing radiation in nuclear testing.

7—Admission to hospital, nursing home or domiciliary for a condition not related to exposure to either Agent Orange or ionizing radiation.

8—Admission to an outpatient program for a condition not related to exposure to either Agent Orange or ionizing radiation.

9—In need of outpatient care for a condition not related to exposure to either Agent Orange or ionizing radiation; referred to community resources.

c. For all VA Forms 10-2875-1 or 10-2875-2, other than code 2 in PURPOSE OF VISIT, where there is an entry other than "0" in BLOCKS 1 through 3 in the SPECIAL SURVEYS SECTION, indicate the following:

IN BLOCK 7

0—Receiving medical care for a condition other than one possibly related to exposure to Agent Orange or ionizing radiation.

1—Receiving medical care for a condition possibly related to exposure to Agent Orange in Vietnam.

2—Receiving medical care for a condition possibly related to exposure to ionizing radiation in Hiroshima or Nagasaki.

3—Receiving medical care for a condition possibly related to exposure to ionizing radiation in nuclear testing.

NOTE: Complete either block 5 or block 7. Do not fill in both blocks.

3. Those facilities having automated tabulating systems are not exempt from collecting and reporting the required data.

4. All VA Forms 10-2875-1 or 10-2875-2 containing [an entry other than "0" in BLOCKS 1, 2, or 3] in the SPECIAL SURVEYS SECTION will be included in the 20 percent sampling of outpatient visits regardless of the terminal digit of the veteran's Social Security number.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1985 [illegible]

Veterans Administration

OUTPATIENT ROUTING AND STATISTICAL ACTIVITY RECORD

IMPRINT PATIENT DATA CARD – OR WRITE IN NAME BELOW

NAME

KEYPUNCHER ALWAYS PICK UP DATE *(Cols. 1-6)* AND FACILITY NO. *(Cols. 7-11)* FROM PLATE IMPRINT AREA, ABOVE

DATE OF VISIT

FACILITY NAME & ADDRESS

1 – *Items must always be completed.
2 – Complete cols. 12-34 as appropriate if social security no. ends in 1 or 5.

BILLING ☐

PRINT LIKE THIS, PRESSING FIRMLY

1	2	3	4	5	6	7	8	9	0

A. SOCIAL SECURITY NUMBER *(Cols. 12-20)*	B. BIRTH YEAR *(Cols. 21-22)*	C. ZIP CODE *(Cols. 23-27)*	D. SEX *(Circle One)* 28	E. POW *(Circle One)* 29
			MALE 0 · FEM. 1	YES 0 · NO 1

F. PERIOD OF SERVICE — 30

0 – KOREA
1 – WWI
2 – WWII
3 – SP. AMER.
4 – PRE-KOREAN
5 – POST KOREAN
7 – VN
8 – POST VN
9 – OTHER/NONE

*G. VETERAN ELIGIBILITY CODE — 31

1 – SC 50% OR MORE
2 – AA/HOUSEBOUND (NSC)
3 – SC LESS THAN 50%
4 – NSC, REC. VA PENSION
5 – OTHER NSC
6 – DOM. MEMBER (NSC)

*H. NON-VETERAN ELIGIBILITY — 32

1 – CHAMPVA
2 – COLLATERAL OF VET.
3 – EMPLOYEE
4 – OTHER FED. AGENCY
5 – ALLIED VETERAN
6 – HUMANITARIAN EMERG.
7 – SHARING AGREEMENT
8 – REIMBURSABLE INS.

*I. PURPOSE OF VISIT — 33

1 – C&P
2 – 10-10
3 – SCHEDULED VISIT
4 – UNSCHED. VISIT

*J. LOCATION OF VISIT — 34

1 – CLINIC (VA STAFF)
2 – CLINIC (FEE BASIS PHY.)
3 – CLINIC (VA STAFF & FEE BASIS PHY.)
4 – WARD
5 – HOSP. BASED HOME CARE
6 – AWAY FROM FACILITY

SPECIAL SURVEYS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

SPECIAL SERVICES

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

CLINIC STOPS *(Cols. 35-38)*

01 - EMERGENCY UNIT		26 -		51 -		76 -	
02 - ADMITTING/SCREENING		27 - GENERAL MEDICAL		52 - GENERAL SURGERY		77 - MENTAL HYGIENE *(Group)*	
03 -		28 - ALLERGY IMMUNOLOGY		53 - CARDIAC SURGERY		78 - DAY TREATMENT CENTER	
04 - PULMONARY FUNCTION		29 - CARDIOLOGY		54 - ENT		79 - DAY HOSPITAL	
05 - X-RAY		30 - DERMATOLOGY		55 - GYNECOLOGY		80 - DRUG DEPENDENCE	
06 - EEG		31 - ENDO./METAB. *(except diabetes)*		56 - HAND SURGERY		81 - ALCOHOL TREATMENT	
07 - EKG		32 - DIABETES		57 - NEUROSURGERY		82 -	
08 - LABORATORY		33 - GASTROENTEROLOGY		58 - OPTHALMOLOGY		83 - MENTAL HYGIENE *(Indiv.)*	
09 - NUCLEAR MEDICINE		34 - HEMATOLOGY		59 - OPTOMETRY		84 - PSYCHIATRY	
10 - ULTRASOUND		35 - HYPERTENSION		60 - ORTHOPEDICS		85 - PSYCHOLOGY	
11 -		36 - INFECTIOUS DISEASE		61 - PLASTIC SURGERY		86 - NEUROBEHAVIORAL	
12 - NURSING		37 - PACEMAKER		62 - PODIATRY		87 -	
13 - PUB. HEALTH NURSING		38 - PUL./CHEST		63 - PROCTOLOGY		88 - READJUSTMENT COUNSELING	
14 - NUTRITION/DIETETICS		39 - RENAL/NEPHROLOGY		64 - THORACIC SURGERY		89 -	
15 - SOCIAL WORK SVC.		40 - RHEUMATOLOGY/ ARTHRITIS		65 - UROLOGY		90 -	
16 -		41 - NEUROLOGY		66 - VASCULAR SURGERY		91 - PHARMACY	
17 - REHAB. MEDICINE		42 - ONCOLOGY/TUMOR		67 - AMBULATORY SURGERY		92 -	
18 - AUDIOLOGY		43 - HBHC		68 -		93 -	
19 - SPEECH PATHOLOGY		44 -		69 - PROSTHETICS/ORTHOTICS		94 -	
20 - PHYSICAL THERAPY		45 -		70 -		95 -	
21 - OCCUPATIONAL THERAPY		46 - DENTAL		71 -		96 -	
22 - CORRECTIVE THERAPY		47 -		72 -		97 -	
23 - COMP. WORK THERAPY		48 - ADULT DAY HEALTH CARE		73 -		98 -	
24 - VISUALLY IMPAIRED		49 -		74 -		99 - EMPLOYEE HEALTH	
25 - SPINAL CORD INJURY		50 -		75 -		00 -	

VA FORM 10-2875-2 SUPERSEDES VA FORM 10-2875-2, JUL 1981. GPO : 1983 O - [illegible]

QUESTION: 3) ALSO ON PAGE 7, YOUR TESTIMONY INDICATES THAT, PURSUANT TO PUBLIC LAW 97-72, OVER "5,500 INPATIENT ADMISSIONS AND 10,000 OUTPATIENT VISITS TO VA MEDICAL FACILITIES FOR CONDITIONS WHICH CANNOT BE DISASSOCIATED FROM RADIATION EXPOSURE HAVE OCCURRED."

B. PLEASE PROVIDE INFORMATION REGARDING THE NATURE OF THE CONDITIONS (ESPECIALLY AS TO MALIGNANCIES) FOR WHICH VETERANS WHO HAVE BEEN EXPOSED TO RADIATION HAVE RECEIVED MEDICAL TREATMENT.

ANSWER: THE FOLLOWING DATA WAS EXTRACTED FROM THE PATIENT TREATMENT FILE (PTF) AND REPRESENT DISCHARGE DIAGNOSES FOR PATIENTS TREATED DURING THE FIRST THREE QUARTERS OF FY'85 AND CLAIMING EXPOSURE TO IONIZING RADIATION. DATA FOR PRIOR FISCAL YEARS HAVE BEEN ARCHIVED AND ARE AVAILABLE ONLY AT A VERY GREAT EXPENDITURE OF RESOURCES. IF IT IS IMPERATIVE, FOR COMMITTEE DELIBERATIONS, WE CAN RETRIEVE AND ANALYZE PRIOR FISCAL YEARS.

	FY'85 Discharges (1st 3 Quarters)
*Infectious and Parasitic Diseases	5
Neoplasms	103
Endocrine, Nutritional and Metabolic Diseases and Immune Disorders	25
Diseases of Blood and Blood Forming Organs	3
Mental Disorders	147
Diseases of Nervous System and Sense Organs	42
Diseases of Circulatory System	149
Diseases of Respiratory System	88
Diseases of Digestive System	103
Diseases of Genitourinary System	44
Diseases of Skin and Subcutaneous Tissue	25
Diseases of Musculoskeletal System and Connective Tissue	46
Congenital Anomalies	1
Symptoms, Signs, and Ill-Defined Conditions	54
Injury and Poisoning	42
Classification of Factors Influencing Health Status and Contact with Health Service	64

*These titles are from the International Classification of Diseases - 9th Revision - with Clinical Modifications a publication of the U.S. Department of Health and Human Services

QUESTION: 3) ALSO ON PAGE 7, YOUR TESTIMONY INDICATES THAT, PURSUANT TO PUBLIC LAW 97-72, OVER "5,500 INPATIENT ADMISSIONS AND 10,000 OUTPATIENT VISITS TO VA MEDICAL FACILITIES FOR CONDITIONS WHICH CANNOT BE DISASSOCIATED FROM RADIATION EXPOSURE HAVE OCCURRED."

C. WERE ALL OF THESE VETERANS PARTICIPANTS IN THE NWTP?

ANSWER: WE DO NOT HAVE DATA READILY AVAILABLE CONCERNING TREATMENT OF VETERANS WHO PARTICIPATED IN THE NUCLEAR WEAPONS TESTING PROGRAM. WE PLAN TO ACCESS COMPUTER RECORDS THAT WE HAVE, AND PROVIDE AN ESTIMATE TO THE COMMITTEE IN THE NEAR FUTURE.

Question #4: During the hearing, Mr. Vogel testified that 104 claims based on radiation exposure in situations other than the NWTP have been allowed. Please explain the nature of those exposures and break them down by diseases categories, and specify how many are malignancies.

Answer: The 104 claims are composed of 63 allowances by DVB and 41 by BVA. The claims allowed by DVB generally involved radiation exposure in a therapeutic or occupational setting. There are 26 malignancies and 37 non-malignant conditions among the 63 DVB allowances. The breakdown by disability category for the malignancies is as follows: skin cancers-8, cancers of the mouth-4, leukemia-4, thyroid cancer-2, testicular cancer-2, cancer of the lymph nodes-2, cancer of the pancreas-1, brain cancer-1, bone cancer-1, and malignant melanoma-1. The breakdown by disability category for the non-malignant conditions is as follows: skin disorders or radiation burn scars-11, cataracts-7, anemias-5, colon disorders-4, bone conditions-4, loss of hair-2, infertility-2, lung disorder-1, and hypothyroidism-1.

The BVA records that were the source of the data regarding the 41 allowed claims that fell within the "Non-Atomic Testing" category are not sufficiently detailed to provide the information requested in this inquiry. The data regarding these 41 allowed claims were obtained from the BVA's Veterans Appeals Control and Locator System (VACOLS), which is used primarily for document tracking and case control. When the BVA receives an appeal that involves radiation as an issue, the appeal is categorized as either a "Radiation - Bomb" (i.e., radiation exposure due to nuclear weapons testing or deployment situations) or a "Radiation - Non-Bomb" (i.e., radiation exposure of all other types) case for tracking purposes. This will be true even if the appeal involves more than one issue, any number of which may have no relationship to exposure to ionizing radiation.

VACOLS is capable of providing summary data on appeals dispositions (i.e., numbers of cases allowed, denied, remanded, etc.), and it can and does cross-reference disposition breakdowns to special appeals categories such as "Radiation - Bomb" and "Radiation - Non-Bomb." However, VACOLS does not provide the reason(s) for the particular disposition of any specific appeal or group of appeals. Therefore, we have no way of verifying how many of the 41 identified "Non-Atomic Testing" BVA appeals were allowed for reasons related to ionizing radiation exposure.

Question #5 (A): Why did the VA testimony make no mention of the status of the epidemiological study, required by Public Law 98-160, of the long-term adverse health effects of exposure to ionizing radiation from the NWTP or provide information on the status of the feasibility question?

Answer: The issues asked to be addressed at the hearing concerned section 1631 of Pub. L. No. 98-525, which permits the substitution of the United States as the defendant in suits filed against contractors alleging injury as a result of the United States' atomic weapons testing program, and the Veterans Administration's implementation of Pub. L. No. 98-542. At the time of the hearing, no final determinations had been made concerning the recommendations that had been received from the Committee on Interagency Radiation Research and Policy Coordination and the Office of Technology Assessment regarding the epidemiological study mandated by Pub. L. No. 98-160 .

Question #5 (B): In my opening statement, I described the status of the scientific feasibility determination as follows:

> Serious questions have been raised by the VA and the Office of Technology Assessment about whether a scientifically valid study can be conducted. That matter is pending with the VA Administrator at this time. I wrote the Administrator on July 24, 1985, and urged that he not find the study infeasible without considering a variety of alternatives I proposed and until the GAO report I had requested on the two so-called "Operation Crossroads" nuclear tests had been released and its implications thoroughly evaluated. On August 26, the Administrator agreed to defer his decision.

Do you agree with this summary of the status? If not, please explain where you disagree.

Answer: The Veterans Administration agrees with this summary.

Question #6: Mr. Vogel, with regard to your reference to "good medical evidence" as being needed to resolve radiation claims, it seems to me that this is what the Public Law 98-160 study referred to in question 5 is all about.

A. What is your position on the need to find ways to carry out feasible epidemiological study?

Answer: The Veterans Administration has undertaken a responsible approach towards exploring ways to carry out a feasible epidemiological study. Prior to the enactment of Pub. L. No. 98-160, the Veterans Administration began to consider ways in which a radioepidemiological study may be conducted. There were consultations with individuals knowledgeable about the health effects of radiation exposure. Advice and recommendations have been sought from the Committee on Interagency Radiation Research and Policy Coordination and its predecessor organization, the Interagency Radiation Reasearch Committee, as well as from the Congressional Office of Technology Assessment. This approach has permitted a thorough exchange of ideas and has generated thoughtful suggestions for research that may prove to be highly productive and yield findings that are statistically and epidemiologically valid and acceptable to the scientific and medical communities.

Question #6 (B): What is your position on the concerns raised in my July 24,1985 letter to the Administrator?

Answer: The Veterans Administration shares the concerns raised in your letter of July 24, 1985, regarding whether it is feasible to conduct a scientifically valid study of veterans who participated in the nuclear weapons testing program or who served in Hiroshima or Nagasaki, Japan, following World War II. As was stated in our August 26, 1985, response, we have undertaken an analysis of the recommendations of the Office of Technology Assessment concerning alternative approaches that may be taken to address, in a scientifically valid way, the issue presented.

Question #7A: At the hearing, Mr. White of DVB stated that the VA would be contacting all NWTP-related and former Japan occupation troop claimants to inform them of the new regulations developed pursuant to Public Law 98-542 and of their opportunity to reopen previously denied claims. Please provide a timetable within which you expect to contact these claimants.

Answer: Notice of the new regulations and an invitation to reopen claims will be sent in all cases where it can be ascertained that service-connection was previously denied for a disease now considered radiogenic under 38 CFR §3.311b(b)(2). We cannot provide a timetable for contacting these claimants because a number of factors, including changes of address and recalling folders from the Records Processing Center, may create significant delays. Listings will be mailed to regional offices this month (December 1985) so that action can be taken as soon as possible.

Question #7B: Will widows of nuclear test-related claimants also be contacted?

Answer: Where our records indicate that a veteran who claimed radiation exposure died as a result of a disease now considered radiogenic under 38 CFR §3.311b(b)(2), notice will be sent to eligible survivors who can be identified.

Question 7C: Please provide a sample of the notification form that will be used.

Answer: Each regional office will prepare its own notification letters which will briefly describe the new regulations and invite a reopened claim. We cannot, therefore, provide a sample at this time.

Question #7D: Please explain whether this notification goes beyond (and, if so, how) the requirements of the court-approved September 16 settlement in Gott vs. Nimmo which specified as follows:

> Within 60 days of the entry of an order dismissing the district court action, the Veterans' Administration (VA) shall send written notice, as described in this paragraph, to the last known address of all claimants or survivors, identified from computer records maintained by the VA Central Office Compensation and Pension Service, whose claims for veterans' disability compensation or survivors' dependency and indemnity compensation based on exposure to ionizing radiation during participation in atmospheric nuclear weapons testing or the post-World War II occupation of Hiroshima and Nagasaki, Japan, were denied by the VA by rating decision dated on or after June 15, 1979, and on or before November 17, 1981.

Answer: The Gott settlement requires that notice be sent to claimants (or their survivors) who were nuclear test participants or members of the occupation forces in Hiroshima or Nagasaki and whose claims were denied within a specified period, whether or not the claimed disability would be considered radiogenic under our new regulations. This new notice is limited to those claimants (or their survivors) whose previously denied claims involved diseases now considered radiogenic, but it is not limited by source of radiation exposure or date of denial.

WRITTEN QUESTION FROM SENATOR SPECTER TO THE DEPARTMENT OF ENERGY AND THE RESPONSE

Question: The argument has been made that the U.S. Government received bad advice on the nature of some of the atomic weapons testing materials resulting in insufficient caution being exercised and inadequate supervision of the tests. How do you answer this in the context of restoring the rights of veterans to sue companies which conducted the tests?

Answer: We answer the argument by disagreeing with the premise upon which it is based. From the very earliest days of the Manhattan Project, the United States called upon the very best minds in the country from industry, government, and academia. They were sought out to assist in the development of atomic weapons (and subsequently nuclear energy for peaceful purposes), while at the same time assuring that every reasonable safety precaution was taken. Advice to government decision-makers, from a myriad of sources, within and outside the government, received considerable scrutiny, peer review, and publication. Indeed, the Atomic Energy Act in establishing the Atomic Energy Commission, provided for a General Advisory Committee of the most prominent scientists and engineers available. The Act also provided for the Advisory Committee on Biology and Medicine, to deal primarily with safety concerns. Both committees had direct access to the Commission.

Oversight by the Joint Committee on Atomic Energy completed the Congressional plan for mandating and assuring that the very best advice possible was forthcoming, considered, and presented to the government officials who had to make the difficult decisions.

In conducting the nuclear weapons experiments, each Test Manager was continually assisted on-site by the Test Manager's Advisory Committee right up until the shot was fired. Each experiments's Advisory Committee was composed of experts in nuclear science, nuclear engineering, meterology, health physics, and related subjects. Senior Public Health Service officers sat on that Committee from the outset of the program.

The advice flowing to the government decision-makers was the very best available and consistent with the state of the art. It may not have always represented a unanimous opinion. Nevertheless, the advice certainly was the consensus reached after responsible debate and critical peer review of issues at the cutting edge of scientific and medical research.

WRITTEN QUESTIONS FROM SENATOR SPECTER TO THE VETERANS' ADMINISTRATION AND THE RESPONSES

Question 1: Prior to the new regulations, how long on average would you estimate it took for an atomic veteran's compensation claim to be processed? Given the new tiers of decision-making responsibility under the new regulations, do you expect the process to be significantly lengthened?

Answer: Prior to the new regulations, the average processing time for compensation claims based on radiation exposure was approximately four months. Adverse determinations that were appealed to the Board of Veterans Appeals were generally resolved within two years from the date of filing of the initial claim. While some claims processed under the new regulations may be delayed because of the necessity for advisory medical opinions or resolution of materially different dose estimates, we will make every effort to ensure that average processing time is not significantly lenghtened.

Question 2: Roughly 99% of the atomic veterans' compensation claims have been rejected to date. Why has this been and what special circumstances tended to be evident in the case of the successful one percent of the claimants?

Answer: There are three major reasons for the denials of compensation based on exposure to ionizing radiation. First, in 40.6 percent of the claims no specific disability was diagnosed. Second, of those cases where an actual disability was diagnosed, many were not conditions shown by sound scientific and medical evidence as capable of being induced by radiation. Third, where radiogenic diseases were diagnosed, there were very low radiation dose estimates for the veterans, or there were other confounding factors such as a long history of cigarette smoking with a diagnosis of lung cancer. Radiation claims that were successful generally involved radiogenic diseases and significant radiation dose estimates or resolution of reasonable doubt in favor of the claimant.

Question 3: Do you expect that a larger number of claims will be favorably resolved as a result of the new regulations? Why?

Answer: The new regulations for adjudicating claims became effective on September 25, 1985, and we not yet have sufficient experience to assess their impact with any reasonable degree of accuracy. In addition, any future modification in the list of radiogenic diseases or their manifestation periods or any change in officially reported dose estimates could materially affect the adjudication of claims. We have begun to collect data on the results of claims adjudicated under the new regulations but meaningful statistics could not be expected until the regulations have been in effect for a reaasonable period of time.

Question 4: How do you answer the argument that the right of veterans who were victims of atomic fallout to sue the companies that conducted the tests is analogous to the right of certain Vietnam veterans to sue chemical companies that manufactured the defoliant Agent Orange?

Answer: Unlike the manufacture of the defoliant Agent Orange, nuclear weapons development and testing involves an inherently and uniquely governmental function. As recognized in the recent Federal court decision in In re Consolidated United States Atomospheric Testing Litigation, 616 F. Supp. 759 (N.D. Cal. 1985), development and testing of nuclear weapons was conducted under the auspices of the Atomic Energy Act (AEA), Pub. L. No. 585, 60 Stat. 755 (1946), which established pervasive governmental control of the production, ownership and use of fissionable materials. This legislation vested all right title and interest in fissionable material in the Atomic Energy Commission, restricted production of atomic weapons and their component parts and established licensing and information control requirements relating to atomic energy. The AEA specifically provided that the paramount objective of the development and use of atomic energy would be national defense and security. Under this system, government contractors engaged in atomic weapons development were, in effect, instruments of national policy, engaged in activities inextricably connected with national security.

In contrast, the development and manufacture of defoliant herbicides, such as Agent Orange, has never been the subject of such governmental controls. Herbicides of this type are not inherently related to military activities and have many legitimate commercial applications. Accordingly, the development and manufacture of defoliant herbicides has not been so pervasively regulated, nor closely associated with national security, as has atomic weapons testing.

Because the two circumstances are not analogous, they do not demand identical recourse to legal remedies.

OVERSIGHT ON ISSUES PERTAINING TO VETERANS' EXPOSURE TO IONIZING RADIATION

WEDNESDAY, DECEMBER 11, 1985

U.S. SENATE,
COMMITTEE ON VETERANS' AFFAIRS,
Washington, DC.

The committee met, pursuant to notice, at 9:30 a.m., in room SR-418, Russell Senate Office Building, Hon. Frank H. Murkowski (chairman of the committee) presiding.

Present: Senators Murkowski, Thurmond, Specter, Denton, Cranston, Mitchell, and Rockefeller.

Also present: Senator Warner.

OPENING STATEMENT OF CHAIRMAN MURKOWSKI

Chairman MURKOWSKI. I would like to bring to order the Veterans' Affairs Committee hearing. The hearing today concerns veterans' exposure to ionizing radiation.

We are going to depart a little bit and ask that the camera lights be turned off for a moment because we are going to run a short film. It is going to be less than 5 minutes, but the purpose of the film is to illustrate some of the problems which we face in dealing with the early technology of atomic radiation. We are going to start off with an excerpt of a film about Operation Crossroads. The beginning of the film outlines the details of the shots.

After we have seen a few minutes of the film, we will begin with the members' opening statements and then move to witnesses' testimony. A little later, we will continue that portion of the film for those that would like to see the entire film. It describes some of the precautions taken by personnel after the atomic shot.

So, if you would be kind enough to proceed.

[A film is shown.]

Chairman MURKOWSKI. Thanks very much, Jim.

I think the film—again, shot in 1946—sets a perspective for just what we are discussing today. Test Baker is also shown in the film and will be made available later on in the hearing, but we did not want to take any more time away from the witnesses.

I want to welcome you all to the second part of the Veterans' Affairs Committee hearing on veterans' exposure to ionizing radiation. From 1945 through 1963, approximately 220,000 service personnel participated in a series of nuclear weapons tests or performed duties which placed them in close contact with ionizing radiation.

It has been more than 40 years since the first detonation of an atomic device. Yet despite some 80,000 reports, studies, and papers compiled on the results and effects of those tests, we are still without practical scientific guidance for long-term health care and compensation policy for those participants.

The Congress has gone to great lengths to sort through the available data. In 1981 legislation was enacted to provide health care eligibility for those so-called atomic veterans. Based on a 1984 law, the Veterans' Administration has issued new regulations with the intent of improving the adjudication process for radiation-related claims.

The Defense Nuclear Agency has, over time, developed a written history of the individual tests and now provides radiation dose estimates for veterans filing claims with the Veterans' Administration. And the General Accounting Office, in its newly released report, has recommended improvements to the Defense Nuclear Agency dose estimate process for Operation Crossroads.

During the 98th Congress, we enacted legislation requiring an epidemiological study of the health of atomic veterans. However, the Office of Technology Assessment informed us that such a study was not scientifically feasible.

So the question before the committee is just what approach should we take. The Congress could continue down our recent path of seeking scientific verifications about radiation dose estimates and scientific study of radiation effects. Of course, the scientific path is a responsible one committed to with the best of responsible intentions.

The problem with this approach is that we have backed ourselves again into a corner. Atomic veterans are quite rightfully demanding answers to the fears of long-term adverse effects of their exposure to ionizing radiation. In the absence of sound scientific information, are we yet going back to another scientific study, or should we perhaps sit back and evaluate the possible policy options before us and then act accordingly.

Well, I believe the most crucial issue before us today is to identify once and for all just who these victims are, determine how many are alive, whether in fact these veterans are ill, and make the determination at the human level.

I believe that our next step is to proceed to locate and care for those veterans who may be ill, determine what sort of illness they have, and then to what degree those illnesses can be connected to their exposure. In addition, for the many atomic veterans who have made their concerns known, require the Government to conduct tests to accurately determine internal dosage in order to aid the Veterans' Administration in the adjudication of those claims.

Earlier this month, I wrote to the VA Administrator, Harry Walters, and asked him to establish an ionizing radiation registry which will for the first time compile all medical and claims information about atomic veterans seeking VA health care or compensation benefits. Through the registry, the Veterans' Administration would be able to determine trends in the health of these veterans.

Today I wish to forward a strong request to the Department of Defense, through the Defense Nuclear Agency. I believe that the Department of Defense has a responsibility to make every effort to locate the participants of the nuclear weapons tests, especially those who can be identified as having been highly exposed to radioactive material. Obviously, the Department of Defense is the appropriate agency having that record material.

After locating these veterans, their health status must be determined, and if it would help to reconstruct their radiation exposure levels, they should be provided with such tests, such as a whole body counter, which measures internal radiation doses. Such a test, I am told, would still pick up radiation in a veteran after all these years if he had had significant amounts of radioactive exposure previously, and again, even some 40 years ago.

I am told that some critics might contend that this is not a scientific suggestion that might not yield a scientific, valid sample. And I say to that contention that science, for all the millions of dollars spent and the thousands of studies which have been completed, has not yet given the atomic veterans the answer they deserve and that the taxpayers of this country have asked for.

We have put ourselves into the shoes of those veterans who wonder if anyone really cares about them. We do care, and therefore I strongly urge my colleagues and the witnesses, that we not depend on science alone, but use all the resources that are available to seek out and determine the health of as many atomic veterans as possible.

I welcome you to the hearing today.

Senator Cranston, I believe you have an opening statement which you wish to make at this time.

Senator THURMOND. Senator Cranston, I have to go——

Chairman MURKOWSKI. Senator Thurmond.

Senator THURMOND. In Senator Goldwater's absence, I must leave to chair an Armed Services Committee hearing. Would you mind if I had my statement entered in the record?

Senator CRANSTON. Of course.

Chairman MURKOWSKI. Senator Thurmond.

Senator THURMOND. Mr. Chairman, I have a statement on this matter. I am very interested in seeing that our veterans who have been exposed to ionizing radiation are awarded the appropriate health treatment and compensation.

I ask that my statement be placed in the record.

Chairman MURKOWSKI. Thank you, Senator Thurmond. Your statement will be entered into the record as if read, and I understand your requirements of time.

[The prepared statement of Senator Thurmond follows:]

PREPARED STATEMENT OF SENATOR THURMOND

Mr. Chairman: I am glad that you were able to hold this hearing today on the subject of ionizing radiation and its effect on the veterans who participated in the Defense Department's nuclear test programs. The issue is one which stirs great amounts of emotion. We must show extra caution, therefore, to ensure that it is approached in a sound yet compassionate manner, with the ultimate goal of seeing that those who are suffering health problems today as a result of their service to their Country receive the recognition and care which they deserve and which we are obligated to provide.

This government has taken some positive steps in the recent past in an effort to meet its obligations to the atomic veterans. With the passage of Public Law 98-542, the Veterans' Administration was required to prescribe special regulations for the purpose of establishing service-connection due to radiation exposure. I was happy to see that law enacted for several reasons. First, it allows for special consideration for veterans who might have been exposed to radiation. Second, and of equal importance, the law makes clear Congress' position that proper remedies for service-connected disabilities should be provided through the Veterans' Administration.

This law, to which I have just made reference to, was signed a little over a year ago, but the regulations did not appear in the Federal Register until well into 1985. I think that we should give the VA and those regulations a chance. I also join with Senator Murkowski in desiring to see a registry established within the VA Health Care system for atomic veterans, similar to the one which was developed for veterans exposed to agent orange.

Mr. Chairman, today the Committee will receive testimony from two different government agencies regarding a specific nuclear test, and the level of radiation to which service personnel were exposed as a result of that test. It is important that we be able to determine as best as we can the level of radiation exposure veterans have experienced in order that we can learn from our mistakes. We must not lose sight, however, of our primary responsibility, which is to take care of those who are ill as a result of their service to our Country. We can conduct hundreds of studies on exposure levels, but the bottom line is whether the veteran's illness is attributable to his service. Exposure to radiation does not necessarily equate with illness. We must direct our efforts and limited resources, therefore, toward recognizing and caring for those who are suffering health problems because of their exposure.

I appreciate the presence of our witnesses today and I look forward to reviewing their testimony.

Chairman **Murkowski**. Senator Cranston, please proceed.

OPENING STATEMENT OF SENATOR CRANSTON

Senator **Cranston**. Thank you, Mr. Chairman.

I join you in welcoming everyone who is here today. I thank you, Frank, for agreeing to schedule today's hearing in response to my request.

It is an extremely busy time just now in the Senate, but I believe this is a very important matter that we have to focus upon right now.

Over the many years I have been involved with a multitude of issues surrounding veterans' exposure to radiation, there has been no more important document than the GAO report that is the subject of today's hearing. A consistent theme that has punctuated the Government statements on this issue has been that there was no need for any action by the Federal Government because few, if any, of the veterans involved in the Nuclear Test Program or with the occupation of Japan after World War II were exposed to other than very low levels of radiation, and such levels are not thought to be a potential cause of harm.

I had never been satisfied regarding the latter point; that is, that there is a safe level of radiation exposure. And I realize that there is significant difference of opinion on that score within the scientific community.

As to the former issue, what were the levels of the veterans' actual exposure, I have been even less satisfied. Now we have available the GAO report which, while it does not purport to establish any exposure levels, casts significant doubt on the assertions by the Defense Department that the only exposures were to low-level radiation. This report, produced by an entity with no stake in the underlying issue, creates, I believe, a strong mandate for further action to sort out the question of the actual exposure experience at Operation Crossroads, and to apply our learning to other nuclear blast exposures as well.

Thus I have undertaken a series of steps to try to find out the facts surrounding this controversy.

First, I requested today's hearing to help define more precisely the issues relating to Operation Crossroads, which need to be resolved.

Second, I have asked GAO to do a followup study focusing on a later nuclear test, as yet unselected, conducted at the Nevada test site, to address the question of whether there were improvements in the safety procedures, personnel monitoring practices, and decontamination procedures during the course of the atmospheric nuclear test program after Operation Crossroads, and if so, to what extent and generally at what point did such improvements actually occur. The Comptroller General has agreed to do this followup. He has assigned it for action and it is now proceeding.

Third, I have requested Defense Secretary Weinberger, in consultation with GAO, to arrange for a new, independent review of Operation Crossroads, taking into account the findings and recommendations in the GAO report. I do not question the integrity of the individuals involved in the DNA efforts, but I do believe that the GAO report has raised questions of such a degree about the results of those efforts as to require a new review to be carried out, and to be carried out by an entity not connected with DNA or with any other reconstruction effort. I have asked the President to carry out his statutory responsibility to see that such objective work is done on this issue. The ball is now in his court.

Fourth, I will be following up with the VA regarding that agency's plans for handling claims for veterans' benefits based on a veteran's presence at Operation Crossroads. The VA is not appearing as a witness today, pursuant to a request from Administrator Walters that the agency be permitted to monitor this hearing and then submit its views in writing, which should be within 2 weeks, so that it can take into account today's testimony.[1]

I congratulate the VA for the generally constructive views the agency provided GAO on a draft of the report.

Fifth, I will continue to pursue diligently getting the Government to carry out scientifically valid studies of the health of veterans exposed to radiation, as was mandated in a 1983 law that I authored. As I mentioned at the first day of these hearings, that decision is now pending with VA Administrator Walters. One option I raised with him was the possibility of making a specific study of Crossroads veterans in light of the GAO report; I intend to press that suggestion.

Finally, I will continue to assist individual veterans and their survivors who are seeking VA benefits, either from exposure at Operation Crossroads or from some other nuclear blast. On this point, I note that the extension which I proposed earlier this year of the health care eligibility for veterans exposed to radiation has just been enacted. That authority will now run through the end of fiscal year 1989.

In closing, I congratulate the GAO for a job very well done on this report.

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[1] See p. 618.

Mr. Chairman, I ask unanimous consent that my statement announcing the release of this report, together with two photographs [1] that I used at that time, and my recent letter to GAO and related letters, be printed in the record following these remarks.

Chairman MURKOWSKI. Without objection.

Senator CRANSTON. I also want to note the work of many others who in one way or another contributed to bringing Operation Crossroads to the fore for a reexamination, beginning, of course, with the late Dr. Stafford Warren, whose papers were the starting point for the inquiry, and including Dr. Robert Ruffvold, who called attention to the presence of the papers at the UCLA Library; Dr. Dorothy Legarretta, of the National Association of Radiation Survivors, who traveled to Los Angeles to review the material; our witness this morning, Anthony Guarisco, who, with his wife Mary, spent a number of weeks at UCLA cataloging the material; and Dr. Arjun Makhijani and David Albright, who prepared an analysis of Operation Crossroads based on the Warren papers.

I note that Dr. Makhijani has submitted an analysis of the GAO report, which I also ask be included in the hearing record, Mr. Chairman.

Chairman MURKOWSKI. It will be entered in.[2]

Senator CRANSTON. Again, I welcome all the witnesses to today's hearing, and I look forward to your testimony.

Thank you all very, very much.

Chairman MURKOWSKI. Thank you, Senator Cranston.

[The following statements and letters were supplied for the record:]

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[1] See p. 385.
[2] See p. 708.

OFFICE OF U.S. SENATOR ALAN CRANSTON
112 Hart Senate Office Building, Washington, D.C. 20510

Press Contact:	Murray S. Flander	Dec. 4, 1985
Office Phone:	202/224-5596	GA01
Home Phone:	703/573-4577	

FOR IMMEDIATE RELEASE

Following is a statement by Senator Alan Cranston (D., Calif.), the ranking Democrat on the Veterans' Affairs Committee, at a press conference in Washington, D.C., today:

Over a period of years, before we and the Russians agreed in 1963 to ban nuclear testing in the atmosphere, the U.S. detonated 235 nuclear bombs in 19 peacetime military operations in the South Pacific and the State of Nevada.

Some 220,000 Navy and Army personnel took part in those open-air tests.

The first of these tests was Operation Crossroads, which was conducted at Bikini Atoll in the South Pacific in 1946.

About 42,000 soldiers and sailors participated.

To date, some 500 of those military personnel, asserting that they suffered radiation damage at Operation Crossroads, have filed disability claims with the Veterans Administration.

None of their claims has been approved.

In rejecting those claims, the VA relied on estimates made by the Defense Nuclear Agency, which said that radiation exposure at Operation Crossroads was within safe limits.

New evidence then came to light disclosing that safety precautions at Operation Crossroads were inadequate and that radiation exposure there had been underestimated.

I asked the General Accounting Office, the investigative arm of Congress, to look into the matter.

(more)

After a 16-month investigation, the GAO found that radiation exposure at Operation Crossroads probably was higher than the Defense Department says it was, and that more than 40% of the military personnel involved--about 17,000 men--had been at special risk.

These were the men who tried to decontaminate the target ships, who retrieved those ships when the test was completed, or who boarded submarines that had resurfaced through the highly radioactive water after the underwater blast.

The GAO reports, for example, that a column of water a mile high and nearly half-a-mile wide threw large masses of highly radioactive water onto the decks and into the holds of the target ships, making them highly radioactive.

The GAO told us that the water in the lagoon remained radioactive to a depth of 6-8 feet for two weeks following the detonation.

Because intense radiation persisted, full-scale decontamination of the target ships was delayed until six days after the blast. Then, after the ships were hosed down with foam and salt water--water that was still radioactive--nearly 2,000 Navy personnel boarded the target ships daily to scrape, scrub and wash the ships in an effort to get them down to acceptable radiological levels.

The GAO report contains two photographs of sailors working on contaminated ships while wearing only ordinary working uniforms with no protective gear. Though the Defense Department has thousands of pictures taken during Operation Crossroads, not one shows decontamination crews wearing protective clothing.

(more)

Even after nine days of decontamination efforts, evidence of probable widespread presence of plutonium was still found on the target ships.

If deposited in the body, even a microscopic amount of plutonium could prove lethal.

With that turn of events, a third scheduled blast was cancelled and Operation Crossroads came to an abrupt end.

About 70 of the 80 target ships later were sunk because they were not considered fit for continued use or because decontamination proved unsuccessful.

The GAO found the Defense Department's estimates of radiation exposure were seriously flawed on a number of counts, and recommended steps by which a more reliable, scientific estimate could be made.

The Defense Nuclear Agency has rejected the GAO's findings and recommendations.

Because of the seriousness of the GAO's criticism and the weight of the evidence upon which that criticism is based, I have asked President Reagan to direct Secretary of Defense Caspar Weinberger to order that a new, independent study be conducted in consultation with the Comptroller General.

We owe that to the veterans who participated in Operation Crossroads and later nuclear weapons tests, to their families, their survivors, and to the American people generally.

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FOR IMMEDIATE RELEASE

Senator Alan Cranston (D., Calif.) released today a new government study questioning a Defense Department claim that military personnel who participated in the 1946 Bikini Atoll nuclear bomb tests were not overexposed to radiation.

Cranston said that based on a 16-month General Accounting Office investigation conducted at his request, as many as 17,000 military personnel involved in Operation Crossroads probably were exposed to more radiation than accounted for in a Defense Nuclear Agency report released in October 1984.

The study by the GAO, the investigative arm of Congress, "raises the question whether what the Defense Department claimed was only very low-level radiation exposure actually was in the mid-level range or even higher," Cranston said. The DNA report estimating radiation exposure at Operations Crossroads was constructed on a computer-based model.

[The GAO report will be the focus of a Veterans' Affairs Committee hearing Dec. 11, Russell 418, at 9:30 a.m. with the GAO as lead-off witness.]

The DNA has rejected the GAO's findings. But Cranston said that "because of the seriousness of the GAO's criticism and the weight of the evidence upon which that criticism is based", he has asked President Reagan to direct Defense Secretary Caspar W. Weinberger to order a new, independent review applying the GAO's findings and recommendations.

(more)

Cranston, who is the ranking Democrat on the Senate Veterans' Affairs Committee, noted that the Veterans' Administration has relied on the DNA's radiation estimates for denying veterans' compensation claims. He said approximately 500 veterans have claimed injury due to radiation exposure during Operation Crossroads. None of their claims has been approved.

But VA Administrator Harry N. Walters, expressing his agency's views on an advance text of the report, conceded that "it does appear that service personnel were exposed to more radiation during the course of Operation Crossroads and the subsequent cleanup than they would have been after safety precautions were better developed and used in later trials".

Walters suggested that the new procedures proposed by the GAO for estimating radiation exposure "be applied to participants in all atmospheric tests" conducted by the U.S. The VA Administrator made these observations in a letter to the GAO.

Following the explosion of the Manhattan Project's atomic device at Alamogordo, New Mexico, in July 1945, the U.S. detonated 235 nuclear bombs in the course of 19 atmospheric test operations at sites in the South Pacific and Nevada. Such open-air tests were banned in 1963 under a pact the U.S. signed with the Soviet Union and Great Britain.

Altogether, some 220,000 military personnel participated in these peacetime atmospheric nuclear weapons tests. Operation Crossroads, conducted in the Pacific Bikini Island lagoon, was the first. Two nuclear bomb detonations were set off there, Shot Able, an atmospheric test, on July 1 and Shot Baker, which was detonated underwater on July 25, 1946.

(more)

In an oral briefing, GAO officials estimated that 41% of the 42,000 Crossroads participants--or 17,000 people--probably received heavier radiation dosages than previously presumed.

The GAO said the highest risk was run by military personnel who tried to decontaminate the target ships following Test Baker, along with personnel who retrieved those ships and crews who boarded submarines which had resurfaced through the highly radioactive water.

The GAO told Cranston that water in the lagoon remained radioactive to a depth of 6-8 feet for two weeks following the detonation.

About 70 of the 80 target ships were later sunk "because they were not considered fit for continued use or decontamination proved unsuccessful".

Cranston said he agrees with the GAO's findings that the 1984 Defense study was seriously flawed because:

1. Only 6,300 of the participants in the Crossroads tests--15% of the total--wore film badges designed to detect radiation exposure. To make matters worse, the DNA's radiation exposure estimates "made no allowance for inaccuracies" in the film or its processing.

While the "DNA acknowledges that the recorded film badge readings would have an overall inaccuracy of approximately 30%", the GAO reports, tests by the National Bureau of Standards suggest that actual exposure could have been twice the amount indicated.

The GAO also "found cases in which beta exposure may have been underestimated or not estimated at all" in the Defense report.

2. Defense's estimate of radiation exposure did not take into account the possibility that "personnel may have retained radioactivity on their bodies and clothes".

The GAO believes this possibility exists because decontamination procedures were only "evolving" at Crossroads.

(more)

The GAO points out, for example, that the earliest evidence it found that military personnel were being required to shower or change clothes after returning from contaminated target ships "was in procedures issued on July 31, six days after the second detonation".

Moreover even after comprehensive decontamination guidelines were issued, the GAO says that "some violations were reported. Thus, Crossroads participants were probably exposed to more radiation than accounted for by DNA."

3. The Defense study did not adequately measure internal radiation exposure. For example, it may have underestimated exposure to alpha rays from inhaling radioactive materials "by a factor of from 5 to 10", according to the GAO.

The DNA also didn't consider the possibility of radiation exposure from ingestion and open wounds.

The DNA "believed, incorrectly, a prohibition against food consumption aboard target ships effectively precluded ingestion," the GAO reports. And the DNA "did not know how to calculate for open wounds".

The GAO recommended that the Defense Department "adjust" its exposure estimates by doing a new "reconstruction", or computer-based simulation, of what happened at Operation Crossroads. The GAO said Defemse should:

1. Develop a range for film badge readings "that recognizes film and film processing inaccuracies".

2. Reasses the accuracy of the external beta radiation dose information for those who wore film badges.

3. Perform a dose reconstruction for external beta radiation since only a relatively small number of participants wore badges.

(more)

4. Estimate the degree of radiation exposure due to "a lack or violation of comprehensive decontamination procedures".

5. Reevaluate the "possible errors or uncertainties" in its analysis of internal radiation exposure by inhalation.

6. Analyze possible internal radiation exposure through ingestion or open wounds.

Cranston, on Aug. 3, 1984, had asked U.S. Comptroller General Charles A. Bowsher, who heads the GAO, to investigate Operation Crossroads when the so-called "Warren papers" disclosed that safety precautions in the tests were inadequate and radiation exposure underestimated.

The papers, a depository of documents at the University of California at Los Angeles, belonged to the late Dr. Stafford Warren, first dean of the UCLA medical school.

An Army colonel, Warren headed a team of 400 physicians, nurses, paramedics and technicians responsibile for monitoring safety precautions and radiation exposure at Operation Crossroads. Earlier he had been in charge of radiation safety on the Manhattan project, which developed the atomic bomb.

It was Col. Warren who recommended the sudden halt to Operation Crossroads.

FRANK H. MURKOWSKI, ALASKA, CHAIRMAN

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STAFF DIRECTOR

United States Senate

COMMITTEE ON VETERANS' AFFAIRS
WASHINGTON, DC 20510

December 4, 1985

Honorable Ronald W. Reagan
The White House
Washington, D.C. 20500

Dear Mr. President,

I am writing to call to your personal attention the enclosed letter that I am today sending to Secretary of Defense Caspar Weinberger.

In this letter, I note a recent report from the General Accounting Office -- "Crossroads: Personnel Radiation Exposure Estimates Should Be Improved" (GAO/RCED-86-15) -- which casts serious doubt on prior Department of Defense estimates of the degree to which service personnel who participated in the Operation Crossroads nuclear test were exposed to radiation. In light of this GAO report, I urge that Secretary Weinberger have a new, independent review carried out of that operation, applying the GAO findings and recommendations. In order to attempt to ensure that any such review is credible to those most concerned about Operation Crossroads -- the veterans who participated in that operation, their families, and their survivors -- as well as the general public, I further urge that the review be carried out by an entity outside of DNA which has no previous involvement with any atomic-test reconstructions.

In this regard, section 601(c) of Public Law 98-160 charges the President with responsibilities for the purpose of ensuring that activities of the Federal Government with respect to adverse health effects in humans from exposure to radiation are scientifically valid and conducted with efficiency and objectivity. Further effort by the Department of Defense with respect to Operation Crossroads clearly is such activity, and I believe that it is vital that such effort be carried out with objectivity, effectiveness, and credibility. Certainly, a review that has little or no credibility would be ineffective. Hence, I respectfully request that, in fulfillment of your section 601(c) statutory responsibility, you direct that Secretary Weinberger provide for the new review I have recommended and that the review be carried out by an independent entity.

Thank you for your attention to this request.

With warm regards,

Cordially,

Alan

Alan Cranston
Ranking Minority Member

Enclosure

FRANK H. MURKOWSKI, ALASKA, CHAIRMAN
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STAFF DIRECTOR

United States Senate

COMMITTEE ON VETERANS' AFFAIRS
WASHINGTON, DC 20510

December 4, 1985

Honorable Caspar W. Weinberger
Secretary of Defense
The Pentagon
Washington, D.C. 20301

Dear Cap,

I am writing with reference to the recently completed General Accounting Office (GAO) report, dated November 8, 1985, "Operation Crossroads: Personnel Radiation Exposure Estimates Should Be Improved" (GAO/RCED-86-15).

This report raises major questions about the conclusions of the Defense Nuclear Agency, as set forth in the May 1984 DNA historical report on Operation Crossroads and elsewhere, that none of the participants at that operation were exposed to other than low levels of radiation. Although I realize that the DNA has rejected GAO's analysis, I believe that that analysis and GAO's point-by-point rebuttal of DNA's official response published in the final report fairly raise the question whether some portion of the 42,000 personnel (GAO has suggested up to 17,000) who participated in the operation were actually exposed to radiation at levels higher than the levels accounted for by DNA.

In view of GAO's analysis and the weight of the evidence on which it is based, I believe that it is incumbent on the Federal Government to take further steps to study this operation to resolve this stark difference of opinion. Thus, I request that, in consultation with the Comptroller General, you arrange for a new, independent review of Operation Crossroads to be carried out with a specific focus on determining the degree to which participants there were or may have been exposed to higher levels of radiation than DNA has calculated. Such a review should take into account all findings and recommendations in the GAO report, including GAO's findings regarding the accuracy of the film badges used, the safety procedures that were prescribed and the extent to which they were followed, the decontamination activities that were carried out by participants, and the possibilities for exposure through inhalation, ingestion, and open wounds.

In order to ensure that such a review will have the credibility necessary to be accepted by veterans who participated in Operation Crossroads, others with an interest in this issue, and the general public, I believe that such a review must be carried out other than by or under the auspices of DNA, which has rejected the report of the GAO. Accordingly, I ask that you have such a review conducted by an entity not previously connected with the Operation Crossroads reconstruction effort or with any other DNA reconstruction of a nuclear test activity.

I look forward to hearing from you in response to this request at your earliest convenience.

With warm regards,

Cordially,

Alan Cranston
Ranking Minority Member

cc: Honorable Charles A. Bowsher

FRANK H. MURKOWSKI, ALASKA, CHAIRMAN
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STAFF DIRECTOR

United States Senate

COMMITTEE ON VETERANS' AFFAIRS
WASHINGTON, DC 20510

December 4, 1985

Honorable Harry N. Walters
Administrator of Veterans' Affairs
810 Vermont Avenue, N.W.
Washington, D.C. 20420

Dear Harry,

I have today written Secretary Weinberger (a copy of my letter is enclosed) in connection with the recent GAO report "Operation Crossroads: Personnel Radiation Exposure Estimates Should Be Improved" (GAO/RCED-86-15), dated November 8, 1985. You reviewed an advanced text of this report earlier this year and submitted your views on it to the GAO on August 26.

I have urged Secretary Weinberger to have a new, independent review of Operation Crossroads carried out, as recommended by GAO, in order to determine the levels of exposure to which participants at that operation were exposed. I believe that such a new review is absolutely vital for many purposes, including, of course, giving veterans and survivors with claims for VA benefits based on participation in Operation Crossroads confidence that the information regarding veterans' exposure on which the VA will base its decisions is as accurate as possible.

In light of your appreciation of the importance of having an investigation of a highly controversial issue carried out by an entity with no preconceived notion about or stake in the result -- as evidenced by your decision to assign to CDC the responsibility for conducting the Agent Orange study -- I urge you to express to Secretary Weinberger your support for such a new, independent review of Operation Crossroads.

Such a statement of support from you would be both particularly valuable -- because the principal beneficiaries of such a new review would, of course, be the veterans who participated in that operation -- and fully appropriate as an exercise of your statutory responsibility, set forth in section 220 of title 38, United States Code, to promote the maximum effectiveness of all governmental activity relating to veterans.

Thank you, Harry, for your ongoing cooperation and assistance and for your attention to this request.

With warm regards,

Cordially,

Alan

Alan Cranston
Ranking Minority Member

Enclosure

FRANK H. MURKOWSKI, ALASKA, CHAIRMAN

ALAN K. SIMPSON, WYOMING
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United States Senate

COMMITTEE ON VETERANS' AFFAIRS
WASHINGTON, DC 20510

November 15, 1985

Honorable Charles A. Bowsher
Comptroller General of the United States
General Accounting Office
Washington, D.C. 20548

Dear Charles,

As the Ranking Minority Member of the Veterans' Affairs Committee, I am writing to you in connection with the GAO report -- Operation Crossroads: Personnel Radiation Exposure Estimates Should Be Improved (GAO/RCED-86-15) -- which you recently completed and transmitted to me.

First, I want to express my appreciation for the high quality of the report -- it is in the best traditions of GAO. The project manager responsible for this report, Mr. Robert J. Baney, should be highly commended for the very thorough, very professional job that he did on this project. I ask that you convey to Mr. Baney and the other GAO employees who worked on this report my sincere congratulations for a job very well done and that a copy of this letter be placed in Mr. Baney's personnel file.

As you know, this report concludes that there are many significant questions about the adequacy of the safety procedures which were in place during Operation Crossroads and also about the degree to which the Defense Nuclear Agency (DNA) has estimated that personnel participating in that operation were exposed to radiation. In view of these important questions and DNA's disagreement with many of the findings in the report, I believe that there is a need for follow-up activity. Therefore, in my Committee capacity, I am requesting that you assign appropriate personnel to continue this project so as to provide me with a report or reports in response to the following questions:

1. Is there a basis for concluding that the safety precautions improved during the course of the atmospheric nuclear test program and, if so, to what extent and generally at what point? In addressing these questions, please select for study and evaluation a nuclear test that was carried out at the Nevada Test Site at a time sufficiently removed from Operation Crossroads so that the changes in safety procedures, if any, would be in place. (Specifically, please consider the possibility of studying Shot HOOD or Shot SMOKY in 1957.) Also in answering this question, please comment specifically on any changes in personnel monitoring procedures and decontamination procedures.

2. In view of the findings in your report, do you recommend that the regulations issued by the Veterans' Administration in accordance with Public Law 98-542 be changed in any way, either with reference to Operation Crossroads or to all nuclear tests or otherwise?

3. In further view of those findings, do you recommend that the regulations issued by the Department of Defense in accordance with section 7 of Public Law 98-542 be changed in any way?

4.A. What do you estimate would be the cost if DNA were to implement fully your recommendation that the "Crossroads participants exposure estimates" be adjusted so as to take into account the various exposure factors identified in the report (on pages 55 and 56).

B. In this regard, the VA, in its advance comments on this report, which were set out in an August 26, 1985, letter from Deputy Administrator of Veterans' Affairs Everett Alvarez (reprinted on pages 68 and 69 of the report), noted that "[w]hile GAO recommends revised methods of calculating radiation exposure levels for Crossroads participants, it appears that this new methodology should also be applied to participants in all atmospheric nuclear tests." What do you estimate would be the cost of such a global effort?

C. Is there any feasible way that an entity other than DNA could be the agent for applying the new methodology, in order to lend the apperance of greater objectivity given DNA's adamant resistance to the GAO analysis and recommendations?

5. In light of all the information gathered in the course of preparing your report, please prepare a series of "worst-case scenarios" in terms of possible levels of exposure for service personnel who were present at Operation Crossroads throughout the operation and who participated in decontamination efforts on target ships?

In a related matter, a report was made public last week concerning certain Air Force veterans' exposure to radiation as a result of their being in aircraft that were flown through the mushroom clouds which followed certain nuclear detonations in Operation Redwing. I am enclosing a copy of that report which also includes a Department of Defense document -- Preliminary Report, Operation Redwing, Early Cloud Penetrations, issued by Headquarters Field Command, Armed Forces Special Weapons Project, Sandia Base, Albuquerque, N.M. -- on this matter. As part of your response to this followup letter, I request that your office investigate this issue, as well as any issues that arise in the course of this investigation with respect to manned planes flying through post-blast nuclear clouds, and report your findings to me. I am particularly interested in learning your views on the extent of exposure to radiation experienced by the Operation Redwing plane crews, whether other individuals were similarly exposed during other detonations, and whether the Department of Defense or other governmental entity or any entity acting for the Federal Government has made any attempt to follow these individuals so as to monitor their health status.

Finally, in view of his excellent work on the November report and the great expertise he has now acquired in this field, I would greatly appreciate that all the work I am requesting in this letter be carried out under Mr. Baney's supervision if that can appropriately and feasibly be done.

As always, I deeply appreciate your cooperation and assistance.

With warm regards,

Cordially,

Alan

Alan Cranston
Ranking Minority Member

Enclosure

Chairman MURKOWSKI. I did not mention this, but the first hearing on this subject was held on November 14. We were unable to accommodate the number of witnesses that indicated an interest, as Senator Cranston has stated, and as a consequence, this is a followup hearing.

Senator Mitchell.

OPENING STATEMENT OF SENATOR MITCHELL

Senator MITCHELL. I thank you, Mr. Chairman, and I commend you for holding this hearing to examine the General Accounting Office report on the radiation exposure estimates prepared by the Defense Nuclear Agency for participants in Operation Crossroads in 1946. In addition, the members of this committee, people of this country, owe a great debt to the distinguished ranking minority member, Senator Cranston, for his vigilance in pursuing the matter of the DNA's dose estimate calculations over the past several years.

This committee must be part of the process by which the facts are discovered, exposed, and to the extent they contribute to our search for the truth, be utilized. This is a difficult issue because of the sensitivity, the lack of absolute knowledge, the scientific uncertainty that existed at the time about the effects on human beings of exposure to radiation. But we have an obligation, if we are to continue to be a society of decency and compassion, to make the fullest, most careful inquiry, then to do what we can, compensate as best we can to correct the errors of the past.

I want specially to acknowledge the contributions made by Robert Campbell of Portland, ME, to my efforts to understand the issues associated with so-called atomic veterans. Mr. Campbell, who was a participant in the Greenhouse series of nuclear tests, serves as Post Commander for Amvets Trinity Post 7-45, the only post of any recognized veterans' organization whose membership consists solely of participants in nuclear test programs. He is also a service officer, Amvets, specializing in atomic radiation claims. I very much appreciate his willingness to share with me his considerable expertise on the entire subject of atmospheric nuclear testing and the VA's compensation claims process.

I ask, Mr. Chairman, that a written statement by Mr. Campbell on Operation Crossroads, Operation Greenhouse, and several other related issues be made a part of the record of today's hearing.[1]

Chairman MURKOWSKI. Without objection.

Senator MITCHELL. It is important that this matter be pursued vigorously, not only from the standpoint of the individual veterans and their families, but from the standpoint of our own concept of what our society is and ought to be. This is not a perfect Nation. Just as the individuals who make up our society make mistakes, so also does our Government make mistakes. The real test of any human society is not its infallibility, because none is; rather, it is its willingness to acknowledge error, and more importantly, once acknowledged, to correct those errors. That is what we are in the process of trying to do here.

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[1] See p. 669.

Again, I commend you, Mr. Chairman, and the ranking member, for your leadership. I hope to work with you to fashion an appropriate response to the issues aired this morning.

Mr. Chairman, I regret that I have a markup in the Finance Committee which I must attend, and will not be able to stay for this entire hearing.

Chairman **Murkowski**. Thank you, Senator Mitchell.

Senator Denton.

OPENING STATEMENT OF SENATOR DENTON

Senator **Denton**. Thank you, Mr. Chairman.

It is a pleasure to be here with you this morning. I, too, have a responsibility to go to the floor and speak on passage of the conference report on the Gramm-Rudman bill. I am pleased to welcome our witnesses this morning from the General Accounting Office, the Defense Nuclear Agency, and members from atomic veterans' organizations, who will testify before the committee today on ionizing radiation and Operation Crossroads.

I was deeply touched by Colonel Dennis' testimony at the last hearing. I feel conscience-stricken with the rest of the Nation that we have not kept abreast of this problem, and concur with remarks I have heard today about the absolute necessity to erase that situation and get to the bottom of this problem.

Through this hearing today, we will attempt to document the scope and effect of ionizing radiation exposure on veterans who participated in atomic testing, as well as the decontamination procedures the Government used in its attempts to determine the results of the tests through onsite inspections of the test vessels. The chairman of the committee has recently asked the Administrator of Veterans' Affairs to establish a radiation registry similar to the registry set up for agent orange, and I strongly support the chairman's action. This collection in a single data base of information on all veterans who have sought health care or who have filed claims against the Veterans' Administration for radiation exposure will certainly facilitate the VA's effort to detect whether there is a recurring medical pattern in this particular group of veterans and permit the analysis of that pattern.

There are many unanswered questions concerning atomic veterans. I commend the chairman for his leadership in calling for the establishment of the registry that will help answer some of those questions. Only after getting all the facts can the Congress act responsibly in formulating policy.

I am glad that our witnesses are here to give us their suggestions and to help us understand all aspects of the situation. I do understand and appreciate the Senator from California's persistent approach toward solving this problem.

Thank you, Mr. Chairman.

Chairman **Murkowski**. Thank you very much, Senator Denton.

We do understand the time demands that are on our members at this time. I have an Intelligence Committee meeting and an Energy Committee meeting, and we will just proceed to do the best we can. They are all simultaneous, and it always happens this way, and that is the way it must be, I guess.

We will start with panel 1, and it gives me a great deal of pleasure to introduce Mr. Keith Fultz, associate director, accompanied by Mr. Carl Bannerman, group director, and Mr. Robert J. Baney, project manager, Resources, Community and Economic Development Division of the General Accounting Office.

I want to commend you jointly and collectively for the report. We look forward to your testimony. Please proceed.

Mr. FULTZ. We appreciate it, sir.

Chairman MURKOWSKI. I have asked that each witness confine their remarks to 5 minutes, and we intend to maintain that time frame.

Mr. FULTZ. In accordance with your request, Mr. Chairman, we will limit our comments. We would like to have our entire statement introduced into the record, however.

Chairman MURKOWSKI. It is inserted into the record as if read.[1]

Mr. FULTZ. Thank you.

STATEMENT OF KEITH O. FULTZ, ASSOCIATE DIRECTOR, RESOURCES, COMMUNITY AND ECONOMIC DEVELOPMENT DIVISION, GENERAL ACCOUNTING OFFICE, ACCOMPANIED BY CARL J. BANNERMAN, GROUP DIRECTOR; AND ROBERT J. BANEY, PROJECT MANAGER

Mr. FULTZ. Mr. Chairman and members of the committee, we appreciate the opportunity to discuss our recently issued report entitled "Operation Crossroads: Personnel Radiation Exposure Estimates Should be Improved."

At the request of the committee's ranking minority member, we evaluated selected aspects of radiation safety at a nuclear weapons test conducted in the Pacific Ocean during the summer of 1946, a test referred to as Operation Crossroads. GAO was asked to specifically evaluate the following three aspects of Operation Crossroads: One, the reliability of the personnel film badges used to measure radiation; two, the adequacy of the personnel decontamination procedures; and three, the accuracy of radiation dose reconstruction in cases where film badges were not worn or were incapable of measuring the type of radiation present.

I would now like to elaborate on each of the areas we reviewed, beginning with an overview of Operation Crossroads.

Following the end of World War II, questions remained among American military experts regarding the best ways to use the nuclear bomb, if necessary, in another war. These experts reasoned that only by testing the nuclear bomb under simulated war conditions could their questions be answered.

With this in mind, the United States initiated nuclear weapons testing in the Pacific Ocean during 1946. Operation Crossroads was the first such test. It consisted of two nuclear detonations in the Bikini Atoll, an island chain in the northern part of the Marshall Islands. One test was made above the water surface on July 1, as we saw in your film, and the other under water on July 25.

This operation involved almost 42,000 military and civilian personnel. It lasted from July 1 to August 10, when operations were officially terminated because plutonium contamination was discovered on the target ships.

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[1] See p. 367.

DNA issued a report on Operation Crossroads in 1984, and has also developed radiation exposure estimates on personnel who participated in that operation. The VA has used these estimates in adjudicating former Crossroads participants' radiation-related disability claims.

I would now like to discuss our findings in each of these three areas. I will keep my comments brief, sir.

The first concerns film badge accuracy. A film badge consists of a small piece of film usually encased in a metal or plastic container that can be pinned to clothing. According to technical literature on film badges, there are inaccuracies associated with their use. These inaccuracies typically exist because of a variance in quality that occurs during film manufacturing and errors that can and do occur during film processing.

We found, however, that DNA's radiation exposure estimates for Crossroads personnel made no allowance for film badge inaccuracy. This was not done, even though DNA has acknowledged that if the film badge processing activities at Crossroads had been done perfectly, then the recorded film badge readings would have had an overall inaccuracy rating of approximately 30 percent.

In addition, the U.S. National Bureau of Standards tested several laboratories in the mid-1950's and found that under controlled laboratory conditions, processing and reading of film badges were often inaccurate by as much as 100 percent.

In our view, it is unlikely that the film badge readings made under harsh field conditions at Operation Crossroads would have been any more accurate than those in laboratories.

The next area I will discuss is personnel decontamination procedures. Personnel working in radioactive areas sometimes pick up radioactive particles on their bodies and their clothes. Recognizing this, personnel decontamination procedures are usually insitituted that will minimize both the spread of this radioactivity and the potential personnel exposure to it. DNA believes adequate personnel decontamination procedures existed from the beginning at Operation Crossroads. Thus, its radiation exposure estimates did not recognize the possibility that personnel may have retained radioactivity on their bodies and clothes after working on contaminated target ships.

However, we believe this possibility exists, because decontamination procedures at Crossroads evolved from very simplistic radiation protection measures to more comprehensive ones.

The third area we were asked to examine concerned internal radiation dose reconstruction. Internal radiation exposure was not measured at Operation Crossroads. Thus, DNA has reconstructed an internal alpha and beta radiation exposure dose for Crossroads personnel.

In doing this reconstruction, DNA assumed that Crossroads participants could receive internal radiation exposure only by inhaling radioactive material. However, we found evidence that internal radiation exposure could also have occurred from eating contaminated food or from cuts caused by or coming into contact with contaminated objects.

I would now like to discuss the recommendations we made to correct the problems identified in our review.

Regarding film badges, we recommended that DNA develop a range for each film badge reading that recognizes any film and film processing inaccuracies. We also recommended that DNA reassess the accuracy of the external radiation dose information for those who wore film badges. And, because not all Crossroads participants wore film badges, we also recommended that DNA perform a dose reconstruction for external beta radiation.

Regarding decontamination procedures, we recommended that DNA estimate the extent to which personnel received radiation exposure from a violation or lack of comprehensive decontamination procedures.

In the area of dose reconstruction, we recommended that DNA reevaluate and disclose the possible errors or uncertainties associated with its analysis of internal radiation exposure by inhalation. We also recommended that DNA analyze possible internal radiation exposure through ingestion or open wounds.

I will now briefly discuss comments received from VA and DOD on our report. VA said it appears that service personnel were exposed to more radiation during Operation Crossroads than if safety precautions had been developed and used, as was the case in subsequent nuclear tests. VA also indicated that our recommended actions for calculating radiation doses for Crossroads participants should be applied to participants in all atmospheric nuclear tests.

DOD, however, generally disagreed with the report's findings, conclusions, and recommendations. Further, according to DOD, even if it implemented all of our recommendations, exposure estimates would increase only 10 percent over its total average calculated dose for Crossroads personnel.

However, in analyzing DOD's comments, we found that, one, DOD provided incorrect or unsupported statements; two, misinterpreted certain Crossroads-related documents; and three, presented information inconsistent with DNA's historical report on Operation Crossroads and other material.

In summary, for the above reasons, we did not change our report based on the comments received. We continue to believe that DOD can improve personnel radiation exposure estimates for Crossroads personnel by effectively addressing and implementing our recommendations.

In addition, let me point out that during the course of our review, and in analyzing DOD's comments, we had technical and medical experts assist us in formulating the positions taken in this report.

This concludes my summary of our statement. We will be pleased to respond to any questions at this time.

Chairman MURKOWSKI. Thank you very much, Mr. Fultz.

[The prepared statement of Mr. Fultz follows:]

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

STATEMENT OF
KEITH O. FULTZ
ASSOCIATE DIRECTOR
RESOURCES, COMMUNITY AND ECONOMIC DEVELOPMENT DIVISION
BEFORE THE
SENATE COMMITTEE
ON
VETERANS' AFFAIRS

Mr. Chairman and Members of the Committee:

We appreciate the opportunity to be here today to discuss our recently issued report entitled Operation Crossroads: Personnel Radiation Exposure Estimates Should Be Improved.[1] At the request of the Committee's Ranking Minority Member, we evaluated selected aspects of radiation safety at a nuclear weapons test conducted in the Pacific Ocean during the summer of 1946--a test referred to as Operation Crossroads. This operation represented the first and largest--in terms of participants--of any of the post-World War II atmospheric nuclear tests conducted by the United States. It involved two nuclear detonations and approximately 240 naval ships, 80 of which were used as targets for the detonations. After the detonations, according to the Defense Nuclear Agency (DNA), approximately 17,100 of the 42,000 person task force were in frequent contact with contaminated naval vessels as they performed such tasks as reboarding the target ships to evaluate the damage and to determine the radiation intensity on the target ships.

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[1] Operation Crossroads: Personnel Radiation Exposure Estimates Should Be Improved, GAO/RCED-86-15, dated November 8, 1985.

The Ranking Minority Member asked GAO to specifically evaluate the following three aspects of Operation Crossroads:

--reliability of the personnel film badges used to measure radiation;

--adequacy of the personnel decontamination procedures; and

--accuracy of radiation dose reconstruction in cases where film badges were not worn or were incapable of measuring the type of radiation present.

In summary, our review showed that the calculation of exposure estimates for each of four radiation types to which personnel were exposed at Operation Crossroads--internal alpha, internal and external beta, and external gamma radiation (each of which is discussed in detail in an attachment to this statement)--needs improvement. The primary reasons we believe such improvement is necessary is because certain factors have not been appropriately considered in the DNA's exposure estimates. For example, the principal device worn to measure radiation at Operation Crossroads--the film badge--was not reliable for measuring both external gamma and beta radiation, as intended, and was not worn by all Crossroads participants. In addition, personnel decontamination procedures did not offer adequate protection for Crossroads personnel throughout the operation. Furthermore, DNA's dose reconstruction analysis for internal alpha and beta radiation has not properly estimated the possible personnel exposure from three potential pathways--inhalation, ingestion, and open wounds.

We have recommended that the Secretary of Defense direct DNA to adjust where feasible, the Crossroads participants exposure estimates by appropriately recognizing such matters as (1) the inaccuracies associated with the film badges in measuring external gamma and beta radiation exposure, (2) the likelihood that personnel received additional radiation exposure from a lack or violation of comprehensive personnel decontamination procedures, and (3) the internal alpha and beta radiation dose possible from all three potential exposure pathways. In addition, where any of the preceding actions have been determined not to be feasible, we recommended that the Secretary of Defense require DNA to document the reasons for each such determination so that the military services can provide this information to the Veterans Administration (VA) and the affected veterans.

In commenting on our report, VA provided a favorable response and indicated that the report's recommendations should also be applied to all other atmospheric nuclear tests. Conversely, DOD provided us extensive comments substantially disagreeing with the report. In evaluating those comments, we found no new relevant information that had not been previously considered in preparing the report and thus, made no changes to our findings, conclusions, and recommendations. We continue to believe that DOD can and should improve radiation exposure estimates for Crossroads personnel by effectively addressing and implementing our recommendations.

I would like now to elaborate on each of the topics I have briefly touched on--beginning with an overview of Operation Crossroads.

OPERATION CROSSROADS

Following the end of World War II, questions remained among American military experts regarding the best ways to use the nuclear bomb, if necessary, in another war. These experts reasoned that only by testing the nuclear bomb under simulated war conditions could these questions be answered. With this in mind, the United States initiated nuclear weapons testing in the Pacific Ocean during 1946. Operation Crossroads was the first such test. It consisted of two nuclear detonations in the Bikini Atoll--an island chain in the northern part of the Marshall Islands. One test was made above the water's surface on July 1, 1946, and the other underwater on July 25, 1946.

This operation involved more participants--almost 42,000 Army and Navy personnel and civilian scientists--than any other atmospheric nuclear weapons test conducted by the United States. It lasted from July 1 to August 10, 1946, when efforts by participating personnel to board and decontaminate the approximately 80 unmanned naval ships used as targets for the two bomb tests were officially terminated because plutonium contamination was discovered on the target ships. If deposited in the body, a microscopic amount of plutonium could prove lethal.

DNA--under direction from the Department of Defense--issued a report on Operation Crossroads in 1984 and has also developed radiation exposure estimates on personnel who participated in that operation. These estimates are a combination of exposure readings from film badges worn by about 15 percent of the Crossroads participants and a computer model exposure reconstruction for those times no film badge was worn and for internal radiation that film badges were incapable of measuring. Because the VA has used these estimates in adjudicating former Crossroads participants' radiation-related disability claims, the Ranking Minority Member of this Committee asked us to specifically evaluate selected aspects of radiation safety at Operation Crossroads.

PRINCIPAL FINDINGS

Film Badge Accuracy

A film badge consists of a small piece of film usually encased in a metal or plastic container that can be pinned to clothing. The film, which is similar to photographic film, is wrapped in paper or other material to prevent light from exposing it. In addition, the container may be sealed or placed in a plastic bag to protect it from water.

The film in the badge reacts to radiation in much the same manner as ordinary photographic film reacts to light. As the radiation is absorbed by the film, it produces a chemical change that causes the film to blacken. The extent of the blackening of the developed film is a measure of the total amount of radiation to which it has been exposed. To determine the recorded radiation dosage, an instrument called a densitometer is used to compare the blackening with that of film of the same type that has been exposed to known amounts of radiation.

According to technical literature on film badges, there are inaccuracies associated with their use. These inaccuracies typically exist because of a variance in quality that occurs during film manufacturing and errors that can and do occur during film processing--unless processing conditions are carefully controlled.

We found, however, that DNA's radiation exposure estimates for Crossroads personnel have made no allowance for film badge inaccuracy. This was not done even though DNA has acknowledged that if the people involved in reading film badges at Operation Crossroads had conducted the film badge processing activities perfectly and without error, then the recorded film badge readings would have had an overall inaccuracy of approximately ± 30 percent. If, on the other hand, the film badge processing activities had not been conducted correctly and errors occurred there, we found that the overall inaccuracy of the recorded Crossroads film badge readings could be greater, and possibly much greater, than the inaccuracy of just the film.

Because data on Crossroads film badges is generally not available, we could not determine whether errors actually occurred during Crossroads film badge processing. We believe, however, that a sense of the range of inaccuracies that could have occurred could be obtained by analyzing the accuracy of film badge processing under controlled laboratory conditions.

In this regard, we found that a considerable amount of information has been developed on the ability of laboratories across the United States to properly process and read film badges. For instance, the U.S. National Bureau of Standards tested several laboratories in the mid-1950's and found that, under controlled laboratory conditions, their processing and reading of film badges were often inaccurate by as much as ± 100 percent. It is unlikely, in our view, that the film badge readings made under harsh field conditions at Operation Crossroads would have been any more accurate than those in laboratories.

Further, Crossroads film badges were also intended to measure external beta radiation. According to DNA, the film badges overestimated the exposure dose for this radiation type because the portion of the film intended for measuring this dose was actually affected by external gamma radiation as well. We found cases, however, in which external beta radiation exposure may have been underestimated or not estimated at all. For instance, we observed that during the month of August 1946, only 21 out of 6,664 film badges worn were recorded as having been exposed to external beta radiation. In assessing this situation, we reviewed one film badge ledger containing entries for about 1,300 film badges. We found that the people reading and processing these Crossroads film badges identified exposure on most of the 1,300 badges and recorded that exposure in the ledger, but did not make an additional entry in the ledger as to the external beta radiation dose associated with that exposure. Consequently, absent a dose estimate in the ledger, such Operation Crossroads personnel who had worn these badges with exposures on them were incorrectly assigned a zero external beta radiation dose.

Personnel Decontamination Procedures

Personnel working in radioactive areas sometimes pick up radioactive particles on their bodies and their clothes.

Recognizing this, personnel decontamination procedures are usually instituted that will minimize both the spread of this radioactivity and the potential personnel exposure to it. Such procedures normally include (1) reporting to a central change station to obtain and put on proper clothing before entering a radioactive area, (2) carrying radiation monitoring equipment into the radioactive area to provide a record of exposure and a means of detecting and avoiding high radiation areas; and (3) upon leaving the radioactive area, returning to the central change station to shower and put on clean clothing.

Because DNA believes adequate personnel decontamination procedures existed from the beginning at Operation Crossroads, its radiation exposure estimates do not recognize the possibility that personnel may have retained radioactivity on their bodies and clothes after working on contaminated target ships. However, we believe this possibility exists because decontamination procedures at Crossroads evolved from very simplistic radiation protection measures to a more comprehensive ones. For example, the earliest evidence that we found of personnel being required to shower or change clothes after returning from contaminated target ships was in procedures issued on July 31, 1946, 6 days after the second detonation. Further, even after comprehensive personnel decontamination procedures were instituted--about 3 weeks after detonation--some violations were reported, such as crews continuing to wear contaminated clothing. Thus Crossroads participants were probably exposed to more radiation than accounted for by DNA.

Internal Radiation Dose Reconstruction

Regarding the third area we were asked to review, we found that internal radiation exposure was not measured at Operation Crossroads because, according to DNA, film badges were incapable of detecting this and radiation instruments intended for this measurement failed due to the influence of humidity and mishandling. Thus, DNA has reconstructed an internal alpha and beta radiation exposure dose for Crossroads personnel in a draft report entitled Internal Dose Assessment--Operation Crossroads. In that report, DNA assumed that Crossroads participants could receive internal radiation exposure only by inhaling, or breathing in, radioactive materials. This analysis estimated alpha radiation, as from plutonium contamination, by using certain information contained in a September 20, 1946, Crossroads memorandum that suggested that a constant ratio existed between this radiation type and beta and gamma radiation. However, subsequent information contained in a November 21, 1946, Crossroads memorandum, and our conversations with the author of this memorandum and a radiochemist at the Department of Energy's Hanford Operations Office, indicate that the alpha-beta-gamma ratio at Operation Crossroads was not constant and that use of a constant ratio may underestimate alpha radiation by a factor of 5 or even 10.

Further, we found evidence that internal radiation exposure could also have occurred through ingestion-as from eating contaminated food or drinking contaminated water-or from cuts or open wounds caused by contaminated objects. When we brought this to the attention of DNA, that agency's assistant nuclear test personnel review manager told us that internal radiation exposure through ingestion was a possibility because personnel--during the course of their decontamination work--were permitted, for a period of time, to eat their meals on board contaminated target ships. This same DNA official added that internal radiation exposure from cuts or open wounds was a possibility but said that this was not discussed in the internal dose assessment report because it is unknown how to calculate for it.

RECOMMENDATIONS

To correct the problems identifed in our review, we recommended that the Secretary of Defense direct DNA to adjust, where feasible, the Crossroads participants' exposure estimates in the following manner:

--Develop a range for each film badge reading that recognizes film and film processing inaccuracies; reassess the accuracy of the external beta radiation dose information for those who wore film badges and, because not all Crossroads participants wore film badges, perform a dose reconstruction for external beta radiation;

--Estimate the extent to which personnel received radiation exposure from a lack or violation of comprehensive decontamination procedures;

--Reevaluate and disclose the possible errors or uncertainties associated with its analysis of internal radiation exposure by inhalation and analyze possible internal radiation exposure through ingestion or open wounds.

In addition, as stated earlier, where any of the preceding actions has been determined not to be feasible, we recommended that the Secretary of Defense require DNA to document the reasons for each such determination so that the military services can provide this information to the VA and the affected veterans.

AGENCY COMMENTS

VA stated that it does appear that service personnel were exposed to more radiation during Operation Crossroads and the subsequent cleanup than they would have been after safety precautions were better developed and used as in subsequent nuclear tests. VA also indicated that our recommended actions for calculating radiation doses for Crossroads participants should be applied to participants in all atmospheric nuclear tests. These new calculations, VA stated, would almost certainly result in reports of higher levels of radiation exposure and could require a reevaluation of previously-denied claims. In this regard, VA stated that it is imperative that any new calculated dose assessment be reported to the VA if dose information had previously been reported in connection with a claim for veteran's benefits.

VA also stated it could not be certain whether changes in radiation dose estimates resulting from our recommendations would require reversal of VA decisions regarding service-connected disabilities allegedly resulting from radiation exposure. For example, even a two- or three-fold increase in an initially small radiation dose estimate would likely be of little significance in the VA's adjudication of a claim dependent upon that estimate.

Increases of such a magnitude could have greater importance where a substantial radiation dose was initially estimated.

DOD generally disagreed with the report's findings, conclusions, and recommendations. Further, according to DOD, even if it implemented all of our recomendations, exposure estimates would increase only 10 percent over its total average calculated dose for Crossroads personnel.

However, in analyzing DOD's comments, we found that DOD
(1) provided incorrect or unsupported statements,
(2) misinterpreted certain Crossroads-related documents, or
(3) presented information inconsistent with DNA's historical report on Operation Crossroads and other material. We believe providing a couple of examples of these conditions would be helpful to the Committee in appreciating why we did not change our report based on DOD's extensive comments.

For example, regarding its statement that implementing all of our recommendations would increase exposure estimates only 10 percent over its total average calculated dose for Crossroads personnel, DOD provided us information that seemingly contradicts this statement. Specifically, in support of its comments, DOD provided us a calculation that showed wearing contaminated clothing for a day could have resulted in a radiation exposure dose which is 18 percent of its total average calculated dose. In as much as instructions requiring Crossroads personnel to change clothing were not instituted until 6 days after the second nuclear test, and personnel began boarding contaminated target ships immediately after both nuclear tests, wearing contaminated clothing on several different days could have occurred. Consequently, this one element could have resulted in a larger overall dose increase than suggested by DOD.

In addition, DOD said that teams initially boarding target ships, including radiation monitors, wore protective clothing in the performance of their work. However, a picture which appeared on page 106 of DNA's historical report does not support this contention. The picture shows a radiation monitor on the target ship USS Hughes which on that day--3 days after the second Crossroads nuclear test--was being prepared for towing. The picture shows the radiation monitor standing beside a welder, wearing a T-shirt, no protective rubber gloves, no protective rubber boots, no protective breathing device and smoking a cigarette--which would have increased his risk for internal radiation exposure.

In summary, for the above reasons, we did not change our report based on the comments received and we continue to believe that DOD can improve personnel radiation exposure estimates for Crossroads personnel by effectively addressing and implementing our recommendations.

In addition, let me point out that, during the course of our review and in analyzing DOD's commments, we had technical and medical experts assist us in formulating the positions taken in this report.

Let me additionally point out that we did not look into the feasibility of doing an epidemiological study of former Crossroads personnel. Congress assigned the task of evaluating the feasibility of undertaking an epidemiological study of atmospheric nuclear weapons testing participants to the VA.

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That concludes my prepared statement. We will be pleased to respond to any questions at this time.

RADIATION TYPES EXISTING AT OPERATION CROSSROADS

Alpha Radiation

Alpha radiation is difficult to detect and its effect is lasting for years. It has a range of only 1 or 2 inches in the air and is incapable of penetrating clothing or even the outer layer of unbroken skin. However, alpha-emitting particles are a primary hazard when absorbed internally.

Once inside, alpha particles are distributed by the body in a manner similar to that of calcium. They are carried to the bones, liver, kidneys, and other parts of the body and deposited. These alpha deposits bombard the tissue surrounding them, causing irritation that is not given an opportunity to heal and thus may lead to malignancy.

Beta Radiation

Beta radiation may travel several feet in the air before being absorbed. In more dense material, such as body tissue, some beta radiation may travel up to half an inch. Clothing normally provides adequate protection from beta radiation. Therefore, beta radiation is a hazard only when beta-emitting particles are either in direct contact with the skin or absorbed internally.

A large quantity of these particles concentrated on the skin will cause irritations much like burns. In addition, beta particles of high energy can be hazardous to the skin and those body organs and glands close to the outer skin layer such as the eyes and gonads. Beta-emitting substances taken into the body have two consequences-irritation of the walls in the intestial tract and the destruction of white blood cells, which decreases resistance to infection.

Gamma Radiation

In general, gamma rays have ranges of hundreds of feet in the air, and they can readily penetrate living and nonliving matter. Because they are highly penetrating, gamma rays pose a significant external exposure hazard. Dense materials, such as lead and steel, are often used as shields against gamma radiation.

Inside the body the ionizing properties of gamma radiation destroy the body cells and upset the normal functions of the body. A high dose of gamma radiation may cause loss of hair. Higher doses may cause nausea and aplastic anemia. As the dosage becomes greater, the bone marrow, spleen, and lymph nodes are affected. The mechanisms that manufacture red and white blood cells are also destroyed. Red and white blood cells not destroyed by gamma radiation are depleted through the normal functioning of the body. If these cells cannot be replaced, the natural medium of conveying nourishment and oxygen to the body cells (red corpuscles) and of combating infection (white corpuscles) is lost, producing anemia and reducing the body's defense against disease.

Chairman **Murkowski**. We are going to break briefly, as Senator Specter has joined us, and has a brief statement. Then we will proceed with the questions.

Senator Specter.

OPENING STATEMENT OF SENATOR SPECTER

Senator **Specter**. Thank you very much, Mr. Chairman.

I appreciate the opportunity to make a brief comment at this time. I commend the Chairman for holding these very important hearings, and I would like to leave a series of questions to be submitted for the record.[1] And I regret that I cannot stay, but I have other commitments, and I thank the Chair.

Chairman **Murkowski**. I understand. Thank you very much, Senator Specter.

Senator **Specter**. Thank you.

Chairman **Murkowski**. There are no other statements to be made of this panel of witnesses?

Mr. **Fultz**. No, sir.

Chairman **Murkowski**. Then we can proceed with the questions.

Did you find in your analysis that the radiation exposure at Operation Crossroads was higher than the Defense Nuclear Agency says it was?

Mr. **Fultz**. Sir, we cannot answer that question.

Chairman **Murkowski**. You do not answer it?

Mr. **Fultz**. No, we do not.

Chairman **Murkowski**. Why not?

Mr. **Fultz**. Based upon the information that we reviewed in analyzing the DOD records and files, we found numerous deficiencies that we believe cause questions as to the accuracy of the doses which they have reconstructed. Only until our recommendations are accurately and fully implemented could you determine the extent.

I would like to state, however, that based upon the types of deficiencies which we found, we believe that the dose estimates would increase, the extent to which I cannot tell you. That is why we called for the reassessment.

Chairman **Murkowski**. Is the implication of reassessment mean a further study?

Mr. **Fultz**. We found enough evidence with what DNA did that we think they should redo their work, yes, sir.

Chairman **Murkowski**. Well, how many times have we seen scientific studies? Was there not reference in the opening remarks to some 80,000. Is this 80,001?

Mr. **Fultz**. I guess so, sir.

Chairman **Murkowski**. Well, oftentimes we are faced with the very dilemma which you now present to the committee. We get an analysis and then the question is. Is it possible with your analysis to make a generalization that would indicate whether these veterans were exposed to higher levels of radiation?

Let me ask you this. Could it be lower?

Mr. **Fultz**. I do not believe so, sir.

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[1] See p. 823.

Chairman **Murkowski**. All right. So your position is that it could be higher, but your recommendation is that a further reevaluation take place.

Tell me about that reevaluation. What specifically would it consist of?

Mr. **Fultz**. I think Mr. Baney would be the best person to address that question, sir.

Chairman **Murkowski**. All right. Mr. Baney.

Mr. **Baney**. OK. With respect to the film badges used at Operation Crossroads, DNA, in their exposure dose estimates for Crossroads personnel, do not include any factor for film badge inaccuracy. The film badges had an inaccuracy factor associated with them. The film in the badges had a certain inaccuracy, and in processing the film badges, the same as you would do with photographic film, there is an inaccuracy associated with that if you do not do it properly.

There is no evidence that, at Operation Crossroads, they properly processed the film badges. We recommend that DNA factor that type of information into their dose estimates.

Chairman **Murkowski**. You recommend that they do?

Mr. **Baney**. Yes.

Mr. **Fultz**. Yes.

Chairman **Murkowski**. And that would enable you to do a more precise evaluation?

Mr. **Fultz**. Yes, sir.

Mr. **Baney**. Yes.

Mr. **Fultz**. I would add, sir——

Chairman **Murkowski**. Now, who would do this? Can you do it?

Mr. **Fultz**. We would like to monitor the efforts that DNA does, if they in fact implement our recommendations.

I would like to add that——

Chairman **Murkowski**. Well, let me ask you this. If you design the terms that you want DNA to basically follow, can you come down with conclusions from that?

Mr. **Fultz**. If it is done properly, I think we both should agree.

Chairman **Murkowski**. No, no. If you design it and oversee it, then are you prepared to make definitive conclusions?

Mr. **Baney**. Certainly we are. Let us——

Chairman **Murkowski**. And you can do that?

Mr. **Baney**. Let us look at, for instance——

Chairman **Murkowski**. Just a minute. You can do this?

Mr. **Baney**. Let us look at, for instance——

Chairman **Murkowski**. Well, just a minute. Can you as an agency do it?

Mr. **Baney**. Yes, with respect to what we——

Chairman **Murkowski**. What is the timeframe?

Mr. **Baney**. With respect to what we did on Operation Crossroads, we went back to the source documents as far as what was occurring at Operation Crossroads. DNA in their exposure estimates do not recognize the possibility that personnel may have continued to wear contaminated clothing after working on contaminated target ships, or may not have promptly showered after working on contaminated target ships.

Chairman MURKOWSKI. Well, let us put it this way. It is conceded that there are certain things that were not done. Now, I am more interested in moving in a positive manner so we can get some conclusions, because this has been going on for 40 years. And if we keep this up, why, the problem is going to go away.

Now, specifically, if you indicate what you want DNA to do, then you are prepared to come down with some definitive positions. My question is, What is the timeframe of accomplishing this?

Mr. BANEY. Well, with respect to a subsequent request we received from Senator Cranston, as far as looking at worst-case scenarios for Operation Crossroads, we have assigned staff and are commencing work in looking at that area. That work is underway. We expect to have information on that within the next 4 months with respect to what were the possibilities as far as overexposure at Operation Crossroads, and we will compare that information with DNA's position that the exposure estimates at Operation Crossroads were extremely low.

Chairman MURKOWSKI. Well, I want answers. You are telling me in 4 months you can give me answers. Is that right?

Mr. BANEY. We will be in a better position to answer that.

Chairman MURKOWSKI. And this is at the request of the entire committee.

Mr. BANEY. We will be in a better position to answer that question, yes.

Chairman MURKOWSKI. I am not interested in a better position. You are in a position now, and you acknowledge you cannot answer because you do not have definitive information from DNA. I understand that.

But what I am asking you is, given the request initiated from this committee to direct DNA to respond to the specifics that you want, will you by May be able to come in with a definitive finding?

Mr. BANEY. I believe we can do that, sir.

Chairman MURKOWSKI. All right. We will give you the resources.

Senator CRANSTON. What was your answer, Mr. Fultz?

Mr. BANEY. I believe we can do that, sir.

Chairman MURKOWSKI. We will give you the resources to ensure that the requests are expedited on behalf of the committee.

Mr. FULTZ. I would like to add, sir, that the charge that you are now giving us was not one of the original charges that we were asked to examine in the Operation Crossroads.

Chairman MURKOWSKI. Well, I know and we did not know that you would come up with a situation where DNA did not give you the definitive information you needed.

We would have welcomed your presence here at any time to the staff indicating that this is the problem, and to expedite the process you needed the input from the committee, and we would have directed DNA, but let us not go over that. Hindsight is cheap, particularly at Christmastime.

I assume, then, we can look forward to a rather significant report as a consequence of your May timeframe.

I think I have concluded the questions. Basically my concern is getting this matter before us where members of the committee can make a sound evaluation based on the best evidence available.

Senator Cranston, I believe you have several questions. Please proceed.

Senator **Cranston**. Yes, I do, and thank you.

Frank, before I start, I want to pay special tribute to the GAO project manager for this report, Bob Baney, who is with us at the witness table. He did a very, very thorough, comprehensive job in pursuing multiple leads and documents at many, many locations. His persistence and high degree of professionalism are a great credit to the GAO, and I thank him for that.

Mr. **Fultz**. We appreciate that.

Mr. **Baney**. Thank you very much.

Senator **Cranston**. Thank you.

First of all--I put this to any one of you—do you have any comments on the Defense Department film we saw this morning in terms of safety procedures and precautions?

Mr. **Baney**. Well, with respect to the dosimeters used at Operation Crossroads, that speaks to the lack of information about that operation. Information on the dosimeters is no longer available. There is a number of different situations we can speak to where the information no longer is available. It has been either lost or destroyed.

So with respect to what happened at Operation Crossroads, you must base your evaluation based upon very fragmentary information.

Mr. **Fultz**. For example, sir, the film badges that were worn at Operation Crossroads, to the best of our knowledge, do not exist today.

Senator **Cranston**. Well, it also seemed to me in that film that we saw this morning, we saw monitoring personnel and sailors preparing to board and returning from working on target ships with no protective clothing at all, for example. Is not that what you saw?

Mr. **Baney**. Absolutely the case.

Mr. **Fultz**. That is right.

Mr. **Baney**. That is, in fact, what is shown in the pictures up there, up by the viewing screen.

[The following pictures were supplied for the record:]

Senator **Cranston**. For instance, in the movie, there was one young man out there with no shirt on.

Mr. **Baney**. Absolutely.

Mr. **Fultz**. For example, sir, we have two additional pictures, which your staff has asked us to bring to these hearings. If we could, I would like to show those to you, and Mr. Baney can describe to you what is occurring.

These, I would add, came from DNA's historical report on Operation Crossroads.

Mr. **Baney**. Both pictures show personnel aboard the target ship U.S.S. *Hughes,* which, based upon available information, was one of the closest, if not the closest, ship to the Test Baker detonation which was not sunk.

The first picture shows how personnel were permitted to dress during the operation, the one on the left.

The second picture shows how personnel were expected to dress on board the same ship 2 years after the operation. The date of the first picture, which is the smaller of the two on the left, is July 28, 1946, 3 days after Test Baker. The picture shows a welder on the left on board the U.S.S. *Hughes* during preparations for towing. Standing beside the welder is a radiation safety monitor. He is wearing a T-shirt, no protective rubber gloves, no protective rubber boots, and no protective breathing device. He is wearing canvas or leather gloves, but their use was later discouraged at Crossroads because both were found to be collectors of radioactive material.

The monitor is also smoking a cigarette, which is visible in the picture. This would have increased his risk for internal radiation exposure, especially to the extent he put his potentially contaminated gloves up to his mouth in smoking the cigarette.

The second picture is 2 years later, the same ship, the U.S.S. *Hughes,* at the Puget Sound Naval Shipyard. The picture shows two people inspecting the ship. You can see the arm of one person and the legs of another. Regarding the second person, he is wearing protective rubber boots which almost come up to his knees with his trousers tucked inside the boots.

Regarding the first person, he is wearing a garment of heavy material, based on the sleeve showing. The sleeve comes down and provides a tight fit with the protective rubber glove he is wearing.

Both individuals are dressed to minimize the amount of unexposed skin. We believe the two pictures viewed together convey a message in and of themselves.

Senator **Cranston**. May the committee keep these?

Mr. **Baney**. Yes.

Senator **Cranston**. Thank you very much.

[The following pictures were supplied for the record:]

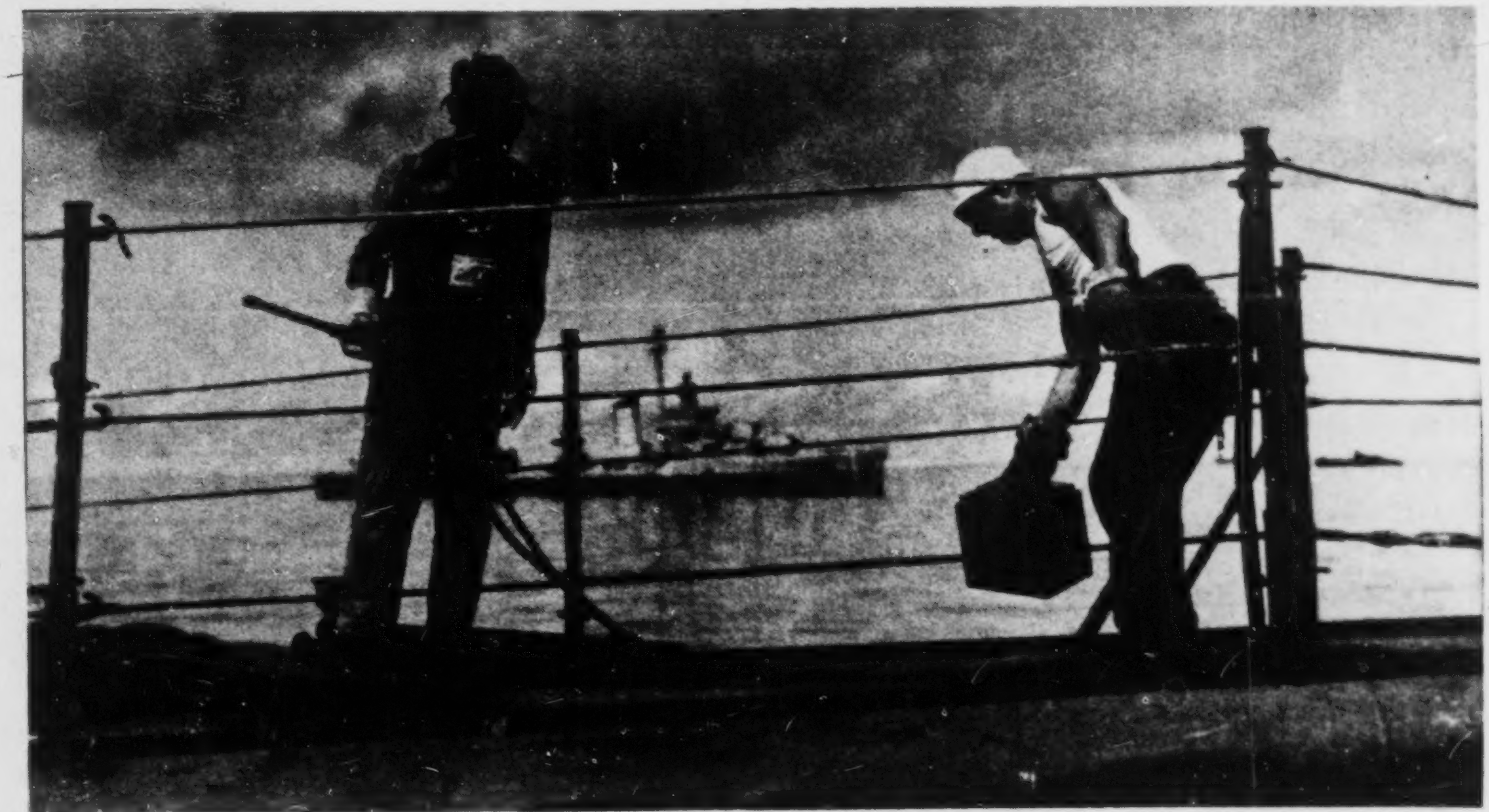

Figure 32. Welder aboard *USS Hughes* (DD-410) during preparations for towing it after *CROSSROADS*.

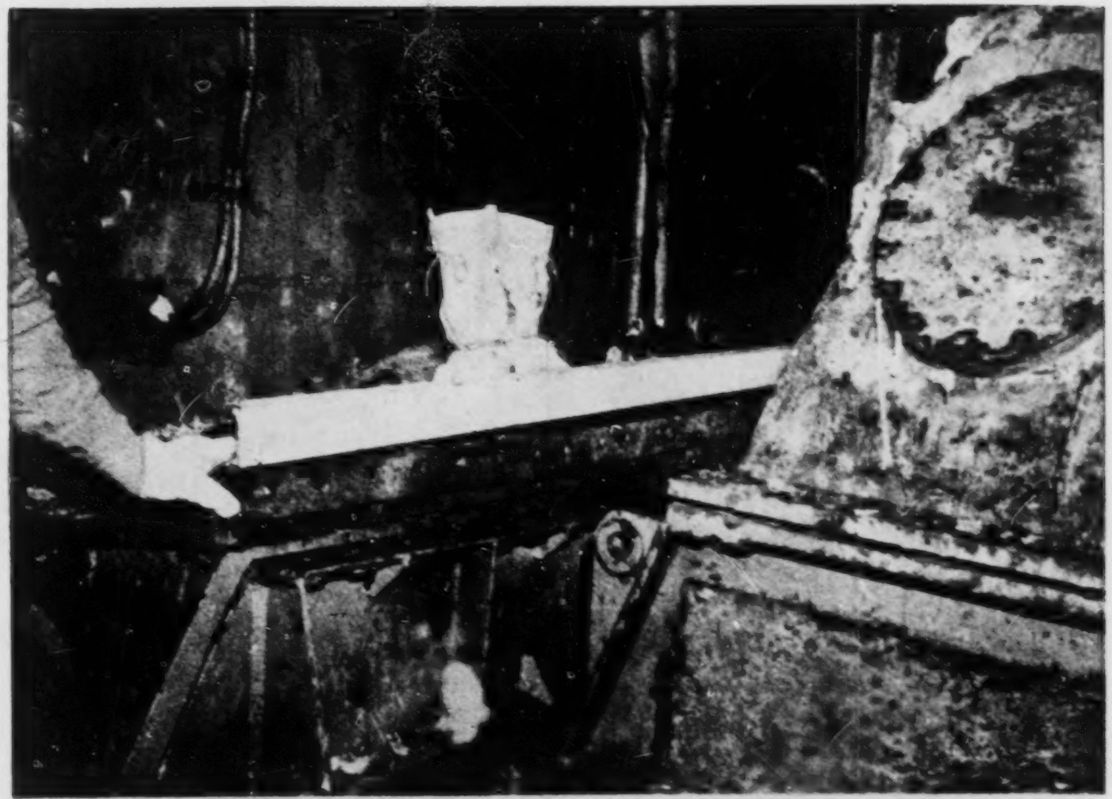

Figure 38. Inspection of USS Hughes (DD-410) at Puget Sound Naval Shipyard in 1948 showing workers wearing protective shoe covers and gloves.

Senator **Cranston**. Regarding the photograph on page 31 of your report, the caption does not identify the ship. I believe you learned later that the ship was the U.S.S. *Salt Lake City,* and that the picture was taken on or about August 6. Is that correct?

Mr. **Baney**. That is absolutely correct.

We asked DNA the date of the picture and what the ship was. They identified that for us as the *Salt Lake City* on or about August 6, 1946.

Senator **Cranston**. What is known about the radiation levels on that ship on that day?

Mr. **Baney**. Average radiation levels on that ship that day were 4 rem per day with a high of 100 rem per day.

Senator **Cranston**. Would that have been for 24 hours of exposure?

Mr. **Baney**. That is for an entire day.

Senator **Cranston**. Moving away from the photographs and back to your entire report, would you now verbally, and then in more detail for the record, please describe, one, the qualifications of the individuals who worked on the report, and two, how the study was carried out, including describing the materials reviewed and the individuals who were consulted.

Do it rather briefly now, but in detail for the record.

Mr. **Fultz**. OK, sir.

First, I would like to assure this committee that GAO had personnel with the necessary background or expertise in this subject area. If we believed it necessary to seek outside assistance, we got it.

Before I address that question directly, I would like to point out that the nature of our request was to essentially review DOD records and files to determine if adequate information existed or if information was available to support actions taken by DOD or DNA. To the extent that technical issues did arise, we called upon a wide range of experts, both in-house and outside GAO, to assist us in our review.

For example, Mr. Baney has been assigned to nuclear-related issues for the past 10 years, including one for this committee about 3 years ago. In addition, I have a nuclear engineer on my staff who was an adviser on this assignment. GAO also has a medical doctor who advised us on the biological effects of radiation. And during the course of our work, we contacted more than 20 experts or specialists in various fields of radiation.

Also, as one final check, a former chairman of the Nuclear Regulatory Commission, Mr. John Ahearn, reviewed our final product and concurred in its findings.

We will submit a detailed list of the names of the individuals I have described here and their particular fields of specialty.

[The following information was supplied for the record:]

EXPERTS OR SPECIALISTS CONTACTED DURING GAO'S REVIEW OF RADIATION SAFETY AT OPERATION CROSSROADS

In the area of blast effects from a nuclear detonation:

- Mr. Walmer Strope, former Crossroads participant, former head of the engineering and operating division at the Naval Research Development Laboratory, former Director of Research at the Defense Civil Preparedness Agency, and now with the Center for Planning and Research.

In the area of film badge dosimetry:

- Dr. Margarite Uhrlich, U.S. National Bureau of Standards, who also reviewed our section on film badge dosimetry and concurred with its findings.
- Dr. Allan Brodsky, U.S. Nuclear Regulatory Commission.
- Mr. Robert Fredericks, Reynolds Electrical and Engineering Company.
- Mr. Jay Brady, Reynolds Electrical and Engineering Company.
- Dr. Gerhard Dessaurer, former head of the Dosimetry Section, Operation Crossroads.
- Mr. Robert Golden, formerly with the Health Physics Division of Eastman Kodak Company.
- Dr. Murray Cleare, Eastman Kodak Company.

In the area of alpha radiation present following a nuclear detonation:

- Dr. Herbert Scoville, former Crossroads participant, and former head of the technical analysis section of the Joint Crossroads Committee.
- Mr. Jerry Goetz, Science Applications Incorporated.
- Mr. Fred Scott, Radiochemist, Westinghouse Hanford Company.
- Mr. Bill Matsomoto, Radiochemist, Westinghouse Hanford Company.

In the area of medical effects from radiation exposure:

- Dr. Robert Conard, former Crossroads participant and former head of the Marshall Island Medical Program at the Brookhaven National Laboratory.
- Dr. Eugene Cronkite, former Crossroads participant, and now with the Brookhaven National Laboratory.

- Dr. David Bradley, former Crossroads participant, and now with Dartmouth College.
- Dr. K.F. Eckerman, Health and Safety Research Division, Oak Ridge National Laboratory.
- Dr. Lauriston Taylor, National Council on Radiation Protection and Measurements.
- Mr. David Kocher, Health and Safety Research Division, Oak Ridge National Laboratory.
- Dr. Harold Wycoff, National Council on Radiation Protection and Measurements.

In the area of dose reconstruction:

- Dr. John Bailor, Harvard School of Public Health.

Finally, Mr. John F. Ahearne, former chairman of the U.S. Nuclear Regulatory Commission reviewed GAO's work.

Senator Cranston. Could you provide a letter from Mr. Ahearn attesting to his review for the record?

Mr. Fultz. Yes, we could, sir.

Senator Cranston. Thank you very much.

[The following letter was supplied for the record:]

RESOURCES
FOR THE FUTURE

John F. Ahearne
Vice President and Senior Fellow

DATE: January 6, 1986

TO: Mr. Keith O. Fultz
Resources Community and
Economic Development (RCED)
U.S. General Accounting Office
441 G Street, NW
Washington, DC 20548

FROM: John F. Ahearne

SUBJECT: Senator Cranston Request Concerning RCED-8615

Carl Bannerman has relayed a request to me. I understand that Senator Cranston has asked for a letter concerning my review of a recent GAO report on Operations Crossroad, GAO/RCED-86-15.

I did review a draft of that report several months ago and provided my comments at that time to Mr. Bannerman. After receiving his request for this letter, I asked for a copy of the final report. I have now read it and have the following comments:

(1) I did not keep a record of my comments on, or a copy of, the draft. Consequently, my remarks now are based primarily on the final report, and my recollection of my earlier comments.

(2) I had a number of minor technical comments on the draft. I believe all were accepted, and this report appears to have made the appropriate corrections.

(3) The GAO produced a good summary of what by now is a difficult historical reconstruction.

(4) The effects of low levels of radiation have been debated for many years and are likely to continue to be controversial. Nevertheless, the significance of errors and uncertainties must be measured by whether, when taken into consideration, estimated exposures exceed accepted thresholds (e.g., ICRP). I recognize this may not have been a part of the congressional request, and therefore not appropriately a part of the GAO report. Perhaps it is for this reason that the

report does not present currently accepted worker exposure levels nor discuss the possible significance of the adjusted Crossroads levels. However, on Page 49 of the report, today's radiation standards are mentioned as possibly having been exceeded, and the DOD's 23 August response raises the issue of comparison to occupational standards.

(5) Finally, the principal, possibly resolvable technical debate remains the ratio of $\alpha:\beta$-γ levels. (See DOD comment on pages 84-85, and the GAO response on pages 112-113.) The GAO report indicates a check with the author of the November 21, 1946 memorandum, which raised the issue, confirmed the GAO's interpretation. The GAO and the DOD differ on the technical validity of this ratio. An impartial but technically knowledgable arbitrator might be able to resolve, or at least clarify, this disagreement--if important to do so.

Senator **Cranston**. DNA, in its comments on the draft report, stated that a review of 35,000 Crossroads medical records showed no evidence of beta burns or any other ailments attributable to radiation exposure.

In the course of your work, did you come across any information which suggested that there was possible medical evidence of ailments attributable to radiation exposure?

Mr. **Fultz**. Mr. Baney will address that question, sir.

Mr. **Baney**. As part of our work, we were not asked to review the medical records of the 42,000 personnel who participated in Operation Crossroads. Nonetheless, we did find a number of instances where radiation exposure apparently occurred.

For instance, in 1947, Dr. Stafford Warren, head of the Crossroads radiation safety section, was quoted as saying, occasionally when a man had taken off his gloves in a highly radioactive area, the radiation safety section had to dissolve the outer layer of skin from his hands with acid.

To the extent that occurred, we do not know why it was not noted in the particular individual's medical record.

Additionally, in 1948, Dr. Eugene P. Cronkite wrote an article about severe depression of the white blood cell count of naval personnel without any recent history of illness or disease. Dr. Cronkite said that the depression was presumptive evidence of excessive radiation exposure. In a discussion we had with Dr. Cronkite, who is now with the Brookhaven National Laboratory, he said the naval personnel he is referring to in the article were aboard his ship, the U.S.S. *Burleson*, at Operation Crossroads, and were involved in retrieving test animals from contaminated target ships.

Senator **Cranston**. Would you please submit those two documents for the record?

Mr. **Baney**. We will be happy to do so.

Chairman **Murkowski**. They will be entered into the record as if read.

[The following articles were supplied for the record:]

DR. WARREN went to Bikini as a colonel assigned to the Army's Manhattan District. On the wall behind him is a relief model of Bikini and its lagoon.

CONCLUSIONS

TESTS PROVED IRRESISTIBLE SPREAD OF RADIOACTIVITY

BY DR. STAFFORD L. WARREN

Dr. Stafford L. Warren is dean of the medical school in the University of California at Los Angeles. During and after the war he was in charge of protecting the personnel of the Manhattan District against the effects of radiation from atomic bombs and radioactive materials. As chief of radiological safety, Dr. Warren was present at the scene of the first atomic bomb test near Alamogordo, N. Mex. and at Bikini. He also led the first radiological survey parties into Hiroshima and Nagasaki.

THE development of atomic bombs has presented the world with a variety of formidable scientific, moral and political problems, nearly all of them still unsolved. One general question, however, has already been answered by the effects of the five bombs set off to date: is there any effective protection for people involved in an atomic war? Our experience at Bikini emphasizes the answer.

Atomic bombs cause damage by a number of massive effects. The first is an instantaneous shower of penetrating radiation. The second is a shock wave and blast of air which rush out from the point of explosion. The third is the release of great quantities of radioactive fission products. The bombs we have observed, however, have provided some conclusive information about the range and effectiveness of radiation produced by atomic bombs.

The first bomb, exploded on a tower in New Mexico, was close enough to the ground to contaminate a half-mile circle of desert with radioactivity. This was acutely dangerous at first and is still mildly active.

The two bombs used in combat, dropped from airplanes over Japan, exploded at a great distance from the ground. The Able Day bomb at Bikini was an approximate repetition of the Japanese blasts, set off under controlled experimental conditions. It confirmed most of our findings about the range of radiation in Hiroshima and Nagasaki. The gamma rays and neutrons emitted instantaneously in these air-drop explosions were enough to have killed or injured nearly everyone exposed within a radius of three quarters of a mile. It should be remembered, however, that this period of destruction was only momentary. Immediately afterward the radioactive elements produced by fission shot into the air with the speed of a rifle bullet and were dissipated by high winds. Neither of the bombs exploded in Japan left any long-lived radioactive contamination in the ground. Some of the salt in the sea water beneath the Bikini bomb was also made radioactive by neutrons and splashed on the target ships. It became relatively harmless the day afterward.

CONTINUED ON PAGE [illegible]

The second Bikini bomb demonstrated an entirely new danger of atomic warfare. Released under water, the products of fission could not escape harmlessly into the air. Instead they were intimately mixed with sea water. Poisonous radioactive spray fell back on the target ships or floated downwind.

Within an hour after the Baker Day explosion radiological safety monitors pushed off toward the Bikini lagoon. Their Geiger counters recorded a solid wall of contamination. Although ships loaded with precious recording instruments were sinking, salvage crews could not go near them. Radio-controlled boats were sent into the lagoon to pick up water samples. Survey planes measured the radioactivity from above. By the second or third day brief trips could be made into the lagoon. After a week most of the ships could be boarded only for a few minutes at a time. A month passed before men could stay on some of the ships for more than an hour. Although the ships are less dangerous now, they will remain contaminated for years.

Three hundred men of the safety section lived and worked in the heavily contaminated area to protect some 42,000 other members of the Bikini expedition. Every group which entered the target area was accompanied by a safety monitor who determined how long it could stay. When a group returned the men bathed carefully and were tested with Geiger counters. If the counter indicated radioactive contamination, the men were sent back to bathe again. Occasionally when a man had taken off his protective gloves in a "hot" area, the safety section had to dissolve the outer layer of skin from his hands with acid. Clothes that were worn in the target area were often measured with Geiger counters and found too contaminated to clean. Hundreds of pairs of shoes and gloves and tons of other clothing were sunk a mile in the ocean because there was no other way to keep them permanently away from human beings.

It penetrates every crevice

THE principal hazard the safety section guarded against in this period was the radiation from fission products which had penetrated every crevice of the target ships. If men had stayed too long in any of the "hot" areas on these ships, they would have later become weak and nauseated. They might have lived for a few days or weeks, only to die ultimately of acute anemia.

As the radioactivity of the fission products lessened, a more insidious hazard was discovered. The area of slight contamination was spreading outside the target area. The algae in the water, moreover, had absorbed radioactive particles and passed them on to little fish. These died at the end of the second week and were eaten by larger fish. These died in the third week, their decayed bodies passing the radioactivity back to the algae. When the algae collected on the bottoms of the expedition's supporting ships, the radioactivity was sometimes strong enough to be detected through the steel hulls. In some instances it became necessary to move bunks back from the hulls to protect the men who slept in them. When the salt-water lines inside the ships became contaminated we had to cut down working time in the engine rooms. Before the crews returned home, the safety section was monitoring almost every bite of food, every drink of water, every piece of laundry, the handrails of ships, the beaches where the men went swimming.

To the relief of the safety section, the task force pulled out of Bikini's contaminated waters three weeks after the Baker Day test. A few monitors and skeleton crews stayed behind to supervise the disposition of the contaminated ships. The deadly range of radioactive products from the atomic bomb had been clearly demonstrated under controlled conditions. The contamination of Bikini could have no serious consequences because the atoll is isolated from human habitation. The contaminated fish were not the migrating kind which could spread radioactivity to other islands. Most important, not one of the 42,000 men who went to Bikini had been detectably injured by radiation.

Some of us have reflected, however, what might have happened if Bikini had been a populous harbor with a wind blowing in from the sea. Fission products equivalent to tons of radium would have been spread over the city. Most of its people would have inevitably died. A smooth-working evacuation system might have saved a few of them, but no defense would have been effective. The only defense against atomic bombs still lies outside the scope of science. It is the prevention of atomic war.

DIAGNOSIS OF IONIZING RADIATION INJURY BY PHYSICAL EXAMINATION AND CLINICAL LABORATORY PROCEDURES

By
Lieutenant Commander Eugene P. Cronkite, (MC), USN
Head, Hematology Section
Atomic Energy Medical Division
Naval Medical Research Institute

Foreword: This article first appeared in NMRI Project 007039, Report No. 8, April 8, 1948.

INTRODUCTION

Prior to the advent of the cyclotron in 1931, sources of exposure to ionizing radiation were limited largely to X-rays, radium, and its disintegration products. The occupational injuries such as radiation burns, ulcers, and carcinoma (52), aplastic anemia (52, 97)*, leukemia (49, 75) and radium poisoning (76) were common among the pioneer workers. In recent years these occupational hazards have been reduced but not entirely eliminated by means of education, refinements in technique, and a better understanding of the biological effects of ionizing radiation.

With the installation of cyclotrons in many universities and scientific institutions and the development of the atomic energy industry, sources of exposure to ionizing radiation are increasing with great rapidity. In addition to the increased number of sources there are the artificial radioisotopes produced by the cyclotrons and the chain reacting piles that are being extensively distributed for scientific study and therapy of radiosensitive diseases. A hazard of contamination of domestic and wild animal and plant life by radioactive substances will occur if any notable volume of radioactive sewage from industrial and scientific services should develop. Again, if atomic warfare should occur, disposal of radioactive fission products will be impossible and widespread contamination of urban areas and watersheds may occur.

Injuries produced by the new sources and radioactive materials are no different than the injuries produced by the old sources. The problem today is qualitatively the same but quantitatively there are more people working with more potent materials. Prevention is the first consideration (104) and recognition of the injury is the second consideration in any program of preventive medicine. The purpose of this report is to outline the available knowledge on diagnosis of ionizing radiation injury by means of physical examination, and laboratory procedures. Dosimetry, the basis of prevention, will be referred to only for illustrative purposes.

In the course of this discussion frequent reference to animal experimentation will be made, where human data are lacking or inadequate. It must be fully appreciated as will be brought out in the course of this report, that the relationship between time of exposure and the appearance of signs and symptoms is not the same for man and smaller laboratory animals. All values for radiation dosage and laboratory procedures are the best possible estimate, based on available knowledge, and will have to be modified as more precise information becomes available.

Both acute and chronic effects may result from either internal or external ionizing radiation. The resulting clinical and laboratory picture is a function of the amount of radiation, its rate of delivery, and the depth dosage (69, 111). This report will be divided into two parts dealing with the single intense exposure and the repeated exposure of lesser intensity.

Diagnosis of single intense exposure to ionizing radiation. For the purpose of the present discussion a single intense exposure will be defined arbitrarily as a total body exposure of more than 25 roentgen units delivered within a few hours. An exposure of 25 r is set as the lower limit because the effects of lesser amounts are most difficult, if not impossible, to detect by clinical means (55). Whether lesser amounts may produce deleterious late effects is not known with certainty. The effect of exposure to ionizing radiation is determined to a considerable extent by the physical characteristics of the ionizing radiation concerned, that is, the type (alpha, beta, gamma, X-ray, or neutrons), the ability to penetrate (type and energy), and the rate at which the radiation is being delivered. With a single accidental exposure that may occur, these physical characteristics are usually known because of the nature of the experiment. Dosimetry (104, 8A) determines to a large extent the above-mentioned physical characteristics. These physical characteristics are important because the clinical picture varies with the number of organ systems involved. Total body exposure to highly penetrating radiation in which all organ systems are affected, produces the severest picture but with a lesser amount of radiation than larger amounts absorbed superficially.

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*Numbers in parenthesis refer to bibliography.

Symptomatology in man following the single intense exposure is quite well known from the experiences of the Japanese following the atomic bomb explosions over Hiroshima and Nagasaki (71, 112).

A few hours after exposure to the atomic bomb ionizing radiations, nausea and vomiting appeared. This lasted for a few hours and then subsided for a variable latent period of days. The shorter the latent period the more severe the symptoms of recurrent nausea and vomiting, mucous or bloody diarrhea, purpura, epilation, and agranulocytic infections. In general, the tempo at which the disease progressed in the Japanese and the Bikini animals was a direct function of the amount of radiation received (17, 71, 105, 112).

Comdr. Cronkite received his A.B. degree in 1936 and his M.D. in 1940 at the Leland Stanford University at Palo Alto, California. He has been on duty with the U. S. Navy Medical Corps since June 1942. Comdr. Cronkite was Hematologist with the Naval Medical Research Section, Joint Task Force One, Operation Crossroads at Bikini in 1946. He is currently Head, Hematology Division, Naval Medical Research Institute and is studying the effects of radiation on the hematopoietic systems and the therapy of radiation illness.

The latent period, the length of time between exposure and the development of symptoms, is of great interest. The duration of the latent period in mammals is inversely proportional to the amount of radiation received. With very large amounts of radiation, in excess of 10,000 r, the latent period becomes very short and death may occur within 24 hours or even while the radiation is being received (17, 23, 47 III). Each species has its characteristic latent period for the development of the full symptomatology. In goats it appears to be 3–5 days; in swine it is approximately 5–7 days (17). In man it is probably longer. It is important to remember that with short latent periods death may occur before the full syndrome develops.

In the case of ionizing radiation that can penetrate only a few millimeters of tissue, signs and symptoms are limited to the surface of the body. Raper (89) has described the effects of beta radiation upon the skin of rats. Robbins, *et al.*, (92) have described the effect of scattered cathode rays on the skin of man. In general one can state that the effects upon skin resemble thermal burns and that anything from erythema and massive vesiculation, to full thickness destruction of the skin may occur. Cutaneous changes are manifested by 1–3 stages depending upon the intensity of the radiation. For full details the reader is referred to the articles by Robbins (92), Raper (89), and Ellinger (22).

The early hematologic responses of man to single intense exposures to ionizing radiation is not well known. Unfortunately, the early blood changes were not observed in the Japanese hence reference will have to be made to laboratory animals in order to get an idea of what might be expected. There is no reason to expect any qualitative difference but there may be significant differences in sensitivity and rate changes in the peripheral blood.

The hematologic responses of laboratory animals to single intense exposures to penetrating ionizing radiation are quite uniform (12, 16, 33, 47, 55, 78). However, following exposure to less penetrating radiation the blood changes may be fleeting, slight or absent despite severe superficial injury.

Beginning shortly after exposure to penetrating radiation there is a prompt decrease in the total lymphocyte count which is most marked within 24–72 hours depending upon the amount of radiation received (55) (Fig. 1 and Table 1). Recovery following a non-lethal dose begins within a few hours or days. Developing simultaneously with the progressive lymphocytopenia is a moderate granulocytic leukocytosis which appears as two peaks approximately 12 and 24 hours after exposure in rabbits (55) (Fig. 1). If counts are not performed at about hourly intervals, one of the peaks may be missed. After the 24-hour peak there is a progressive decline in the granulocyte count for the next 4–6 days when there is a fleeting increase in granulocytes which is paralleled by a wave of bone marrow activity (4). This activity is short lived and the granulocytes again decrease. The subsequent course depends upon whether the exposure is lethal or non-lethal. In non-lethal exposures a sustained though small rise in the granulocytes appears around 15–17 days. In lethal exposures this sustained return of granulocytes is absent (17). Granulocytic leukocytosis may not occur after very heavy radiation (47 II, 47 III).

Reduction in the number of platelets, red cells, and the morphologic changes in the leukocytes appear more slowly and are not so uniformly observed. In the Bikini goats and swine a marked shower of immature red cells appeared in the peripheral blood 10–12 days after the atomic bomb air burst (16). This phenomenon has been repeatedly observed in smaller laboratory animals (111). Atypical and immature leukocytes and nucleated red cells appear in the peripheral blood beginning 3–10 days after exposure (16, 111).

In concluding the section of this report on the single intense exposure to ionizing radiation it is felt that the following can tentatively be stated regarding man, until actual observations substantiate or refute these suppositions. If no decrease in the total lymphocyte count occurs in the first 48 hours, usually the first 24 hours, the exposure has certainly been less than 25 r and symptoms probably will not appear. If exposure has been between 25–100 r a fleeting lymphocytopenia will develop and symptoms will probably be mild. If exposure is between 100–200 r the lymphocytopenia will be of greater severity and last longer. Severe symptoms of radiation illness and death will occasionally occur. If exposure is greater than 200 r the symptomatology of radiation illness will be much more severe and deaths will occur more frequently. The leukocytic changes particularly the early lymphocytopenia, will be marked.

The foregoing determination of a decrease in total lymphocytes or total leukocytes unfortunately cannot be predicated on a normal average for man or animals. The range of normal blood cell counts is great for all animals particularly in mongrel populations like man (12, 29, 82). Normal hematologic values of man will be considered in the second part of this report along with schemes for the detection of deviation from the normal ranges. Needless to say, in order to detect fleeting changes in members of the leukocyte population total white and differential blood cell counts must be performed every hour or so.

Diagnosis of acute radiation illness by the leukocyte count is obviously totally impractical under conditions of a catastrophe or atomic warfare. Hence the development of an easily-read casualty dosimeter is imperative.

The diagnosis of cumulative small exposures to ionizing radiation. The diagnosis of repeated small exposures to ionizing radiation presents an entirely different problem. The changes are insidious and progressive. If excessive cumulative exposure is not detected early, the changes may be irreversible and may lead to serious and fatal diseases (33, 38, 39, 48, 49, 52, 59, 75, 76, 79, 85, 97, 111). At the present time 0.1 r/day has been set as the maximum amount of radiation that can be tolerated daily with impunity. Animal experimentation by Lorenz, *et al.*, (74) on mice suggests that the tolerable dose of radiation for females should be set even lower because of increased incidence of ovarian tumors.

The physical characteristics of the radiation determine to a great extent the effects that will appear from chronic exposure. The penetrating radiation may result in generalized systemic and hematologic disorders in addition to the purely superficial effects of radiation with a very low degree of penetrability.

The physical characteristics of the radiation are usually known as a specific job hazard. Relative exposure to beta, soft X-ray and gamma radiation is determined by suitable dosimeters (104, 8A).

The superficial lesions that appear are largely limited to the skin and eyes. Cutaneous lesions are apt to appear in fluoroscopists, radiochemists, and radium handlers. An increased brittleness of the finger nails with a tendency to develop increased longitudinal ridges is common. Later there may be a loss of the integrity of the fingerprint due to patches of atrophy. Pigmentation, ulceration, and carcinoma may follow the atrophy. Epilation of hairy parts may occur. Impaired sensation of the finger tips commonly accompanies the above changes (52, 110). In the eyes, radiation cataracts may occur at an early age (97). However, the alteration in the blood is the best biological index of chronic total body over-exposure to ionizing radiation.

Many investigators have called attention to the great variability of the blood of man chronically exposed to ionizing radiations. Leukocytosis, lymphocytosis, leukemoid reactions, leukocytic leukemias, erythrocytosis, reticulocytosis, leukopenia, thrombopenic purpura, aplastic anemia, and leukopenic leukemias have all been reported as produced by chronic exposure to radiation (21, 33, 38, 39, 49, 52, 59, 62, 75, 76, 79, 85, 97, 109, 111). The blood picture may be temporarily or permanently altered by many diseases and industrial intoxications in addition to radiation. For example, infectious mononucleosis may affect the total and differential white blood count of young adults for many months after symptomatic recovery (19). Examples of industrial poisons which affect the blood are benzol (36, 37) and heavy metals (52). Hence it is apparent that a "normal" range of blood counts for man must be established. This is difficult because the blood picture varies with age and to a variable degree with sex, pregnancy, meals, humidity, and temperature.

Osgood (82) gives the "normal" values for individuals of different age and sex (see Table 2).

In naval personnel without any recent history or sign of disease (18) between the ages of 17–35 in the tropics and in a temperate zone, the total white count varied from 4,000–16,000. The total lymphocyte count was usually below 3,000 and rarely above 5,000. Probably 90 percent of the adult population will have total white counts between 5,000 and 11,000 per cmm. The 10 percent of adults whose counts are outside of this range may cause considerable consternation in a radiological safety program and lead to medico legal problems.

Goldwater (36) has correctly called attention to the wide range of normal lymphocyte counts in his data and that of Osgood (82). The data on naval personnel confirm this concept. In addition Goldwater calls attention to the necessity of having comparable parallel control studies on subjects that are not subjected to any known toxic agents.

How are the blood changes of prolonged or repeated exposure to radiation determined? It is apparent that the average count is not dependable for the general population or specific age groups, hence base line complete blood counts must be performed on all individuals before exposure takes place. Subsequent counts should be performed at not less than monthly intervals. Notations on the occurrence of colds and infections, must parallel the blood records for without these base line records and a knowledge of each individual's response to infections an evaluation of leukocyte changes is more difficult.

A partial review of the literature (21, 22, 38, 39, 48, 52, 59, 60, 62, 76, 78, 79, 85, 97, 109, 111) confirms the opinion that if any of the following alterations are noted in an individual whose usual blood values are known and who has been exposed to ionizing radiation it is presumptive evidence of excessive exposure until proved otherwise:

a. A persistent depression of the total leukocyte count below 4,000 per cmm.

b. A persistent elevation of the total leukocyte count above 15,000 per cmm. with an absolute lymphocytosis.

c. A relative lymphocytosis with a low total count (4,000-6,000. per cmm.) that returns to base line range following removal from exposure.

d. An increased mean corpuscular volume (MCV), a shift in the Price-Jones curve to the right, an increase in the mean corpuscular diameter (MCD).

e. A reticulocyte count over 2 percent.

f. An erythrocytosis:
  (1) Red blood count over 5.8 million per cmm.
  (2) Hemoglobin over 18.0 gm/100 cc. blood.

Many other phenomena have been suggested as hematologic evidences of excessive exposure. Changes in blood coagulation, prothrombin time, platelets (60), and morphologic changes in leukocytes (97) have been suggested. It is exceedingly difficult to evaluate the importance and the diagnostic value of these changes. A more recent observation on excessive exposure has been the description of refractile "Dickie bodies" in the lymphocytes (21). These refractile bodies are stained with neutral red in a supravital preparation and the authors believe that increased numbers of the bodies are specific evidence of exposure to radiation or industrial poisons. The procedure necessitates a flawless supravital technique which is not widely available, hence the technique may not be generally useful. Limited personal experience with swine and goats suggests that these bodies appear irregularly in lymphocytes as the lymphocytes age in the supravital preparations, hence a rigid time control might be necessary.

The foregoing criteria depend upon abnormalities in the enumeration or morphology of blood cells which arise from either depressed hematopoiesis, an increased lability of the hematopoietic organs, or abnormal maturation. The establishment of the presence of these criteria must of necessity be done without adequate controls that would not be permitted in the average biologic experiment. Hence it is much better to have some type of human control. This can be attained by establishing a comparable control group which are not subjected to any known toxic agent and performing parallel studies upon this group. Average values for exposed and control groups should be studied statistically to see if there are significant differences between the means of the two groups. In a comparable fashion the pre-exposure counts of the exposed group can be used as the control. If the average leukocyte count of the group for a given exposure period is significantly less than the group average leukocyte count of the pre-exposure period one can state with considerable certainty that excessive exposure to ionizing radiation or other toxic agent has occurred.

The following procedures will aid in determining the cause of any abnormal blood findings in a person suspected of having been excessively exposed:

a. Remove the suspect from all possible exposure to ionizing radiation.

b. Do differential counts of radiation on excreta, nasal swabs, and expired air in order to estimate the type and degree of internal exposure to radioactive isotopes.

c. Study the blood at weekly intervals and compare with the pre-exposure base line leukocyte counts and search for an increase in the number of highly refractile, neutral red bodies in the lymphocytes.

d. Endeavor to eliminate other factors such as infectious lymphocytosis, infectious mononucleosis, virus diseases, benzol poisoning, and heavy metal poisoning.

SUMMARY AND CONCLUSIONS

1. The diagnosis of a single excessive exposure to ionizing radiation by blood examination is not difficult. If serious exposure has occurred, a prompt, marked lymphocytopenia results and is followed by a characteristic sequence of events in the other members of the leukocyte population.

2. The diagnosis of repeated exposures to small amounts of ionizing radiation in an indi-

vidual is much more difficult and uncertain. It requires in addition to blood studies, differential counts of radiation in urine, feces, and nasal secretions, and lastly the elimination of other industrial hazards.

3. The determination of repeated exposure to small amounts of ionizing radiation in groups of personnel by the statistical comparison with a control group or by statistical comparison of the pre- and post-exposure average leukocyte count is a reasonably accurate diagnostic procedure.

4. The main bulwark of protection from ionizing radiation must remain physical control of radiation intensities by established monitoring procedures and prevention of contamination of personnel by radioactive materials. This is essential because most of the signs and symptoms appear relatively late after the radiation injury has been sustained.

TABLE 1—*Tabulation of the changes in white blood cells of rabbits after exposure to ionizing radiation**

Dose (r)	Degree of depression in percent		Time of maximum depression in hours		Time required before return to normal limits (days)	
	Lymphocytes	Heterophils	Lymphocytes	Heterophils	Lymphocytes	Heterophils
5	0	0	—	—	—	—
10	0	0	—	—	—	—
25	25	0	24	—	2	—
50	25+	0	48	—	16	—
100	50	—	48	—	36	—
300	74	±	24	±	50	±
500	90	50	48	72	50	9
600	90	75	48	96	50	9
700	90	80	48	96	—	—
800	90	90	72	96	50	23

* From Jacobson, *et al.* (55)

TABLE 2—*Tabulation of the variations of the leukocyte count of man with age and sex**

	Number of Subjects	Age (In years)	Sex	Average in 1000's per cmm.	Range
Leukocyte count	86	4–7	M&F	10,400	6,000–15,000
	242	8–18		8,300	4,500–13,500
	269	19–30		7,400	4,500–11,500
				%	%
Neutrophiles, segment	241	4–14	M&F	38.0	18–58
	120	15–19		48.0	25–75
	236	20–30		54.0	33–78
Neutrophiles, band	219	4–13	M&F	3.0	0–10
	378	14–30		0.8	0–5
Lymphocytes	241	4–14	M&F	48.0	21–71
	120	15–19			22–62
	236	20–30			18–65

* From Osgood (82)

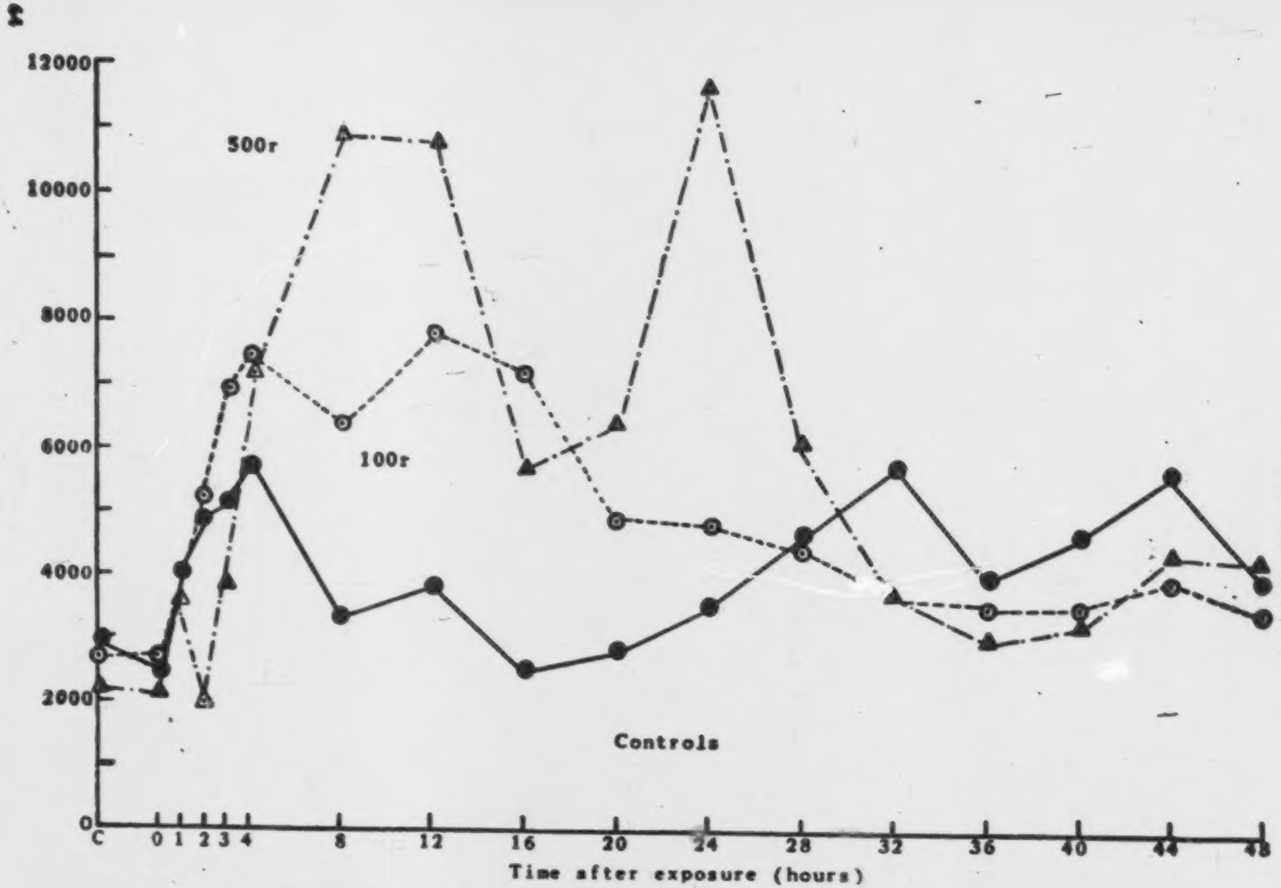

Figure 1 - The initial effect (during the first 48 hours) of total body X-irradiation on the number of heterophils in the peripheral blood. Jacobson, *et al.* (55)

Senator CRANSTON. In your report, you recommended that the Secretary of Defense direct DNA to take certain steps to adjust exposure estimates for Operations Crossroads veterans. Last week, I wrote Secretary Weinberger and the President to urge that we have a new review made of Operation Crossroads, and that the review be done by an entity other than DNA or one of the contractors which had previously done nuclear test reconstruction work.

I believe such work must be done by an entity that will have credibility with veterans and the public on this issue. DNA at this point does not have that credibility, in my opinion.

Do you have any objection to such a new, independent review being carried out, rather than having DNA reassess exposure levels?

Mr. FULTZ. No, we do not, sir.

Senator CRANSTON. What were your reactions to the DNA comments on the draft report?

Mr. FULTZ. Quite frankly, sir, I was disappointed. I did not believe that DNA or DOD gave adequate consideration to the report's findings, conclusions, and recommendations. And, as I stated, we had great difficulty with the types of comments which we received from DNA. Our report includes a 15-page rebuttal to their comments.

We would be glad to meet with DNA to discuss those in great detail, if you would suggest or would like.

Senator CRANSTON. For the record, not verbally now, would you please comment on DNA's rebuttal of your findings and its testimony on page 7 to 12 regarding film badge accuracy and processing at Operation Crossroads, particularly in comparison to the laboratory tests that you describe in your report. If you would just submit that for the record.

Mr. BANEY. Yes, we will be happy to do so.

In essence, DOD said that the film badge processing at Operation Crossroads in 1946 was better than was experienced by laboratories in the United States processing film badges during the 1950's and 1960's.

With respect to Operation Crossroads, there is evidence that the people involved in processing the film badges was being depleted. They were losing staff, and were having to work long hours to keep up with the workload.

With respect to laboratories in the fifties and sixties that we looked at that were tested on their ability to process film badges, there is no evidence of similar conditions. For that reason, we believe that the laboratories in the fifties and sixties, with respect to what they found and how accurate they processed film badges, were as good or if not better than what could have been experienced at Operation Crossroads.

Mr. FULTZ. We will, sir, submit that to the record if you would like.

Senator CRANSTON. Thank you very much. Yes, I would like that.

[The following information was supplied for the record:]

FILM BADGE ERROR RANGE

DOD agrees that film badges provided only an approximate estimate of gamma radiation exposure for Crossroads personnel. It contends, however, that the error associated with the film badges is ±30 percent as opposed to as much as ±100 percent as discussed in GAO's Operation Crossroads report (GAO/RCED-86-15).

DOD's estimate that the error is ±30 percent is based on the educated judgement of its consultant on film badge dosimetry and represents the inaccuracies associated only with the film. It does not include the possible inaccuracy associated with processing the film. Because there are no data on actual Crossroads film badge processing accuracy, GAO analyzed film badge processing accuracy attained under controlled laboratory conditions. In this regard, GAO found--in 1953 and in 1963--laboratories were tested on their ability to properly assign radiation estimates to film badges that had been exposed to known amounts of radiation, and these laboratories were frequently in error by ±100 percent. GAO believes that it is unlikely that film badge dosimetry results developed under harsh field conditions at Crossroads were more accurate than the more recent test results obtained under laboratory conditions.

On the other hand, it is DOD's position that the procedures and controls followed at Operation Crossroads were better than those followed in the two laboratory studies. GAO disagrees. DOD provided no evidence that either the film badge storage, exposure, and processing or the laboratory equipment used had been better at Operation Crossroads than it was in the laboratories being tested. Moreover, GAO believes DNA has understated the possible uncertainties associated with the Crossroads film badges in three of five possible areas--calibration, environment, and densitometer (a machine used to read the film badges). For instance, DOD states that eight areas of each Crossroads film were read with the densitometer to ensure accuracy. However, in reviewing for example, the original film badge ledger for the first 350 film badges processed at Crossroads, the ledger shows that only 15 of the 350 film badges had 8 readings recorded. For the other 335 films, only 2 readings were recorded. It is possible that the Crossroads personnel processing these 350 films did read 8 areas on each film, but no proof of that is contained in the ledger--the only documentation that showed the recorded results.

MINIMUM FILM BADGE DETECTION LEVEL

DOD disagrees that Crossroads film badges were incapable of reading below .05 rem of radiation and offers, as proof, evidence that some Crossroads participants were assigned film badge doses at the .01 to .04 rem level.

However, according to a 1947 report by the former chief of the Crossroads dosimetry section, the film badges used at

Crossroads permitted dose measurment only as low as .05 rem. In addition, according to a letter written by DOD's film badge dosimetry consultant, to DNA's assistant NTPR program manager, dated January 9, 1985,

> "it is questionable whether exposures of 40 MR [.04 rem] or less could be reported with any accuracy during Crossroads. Minimum exposures of 40, 30, or even 10 MR [.04, .03, or even .01 rem] can be reported for film badges exposed under laboratory conditions, but these exposures could not be reported accurately with film badges stored, exposed, and processed under the harsh environmental conditions during Crossroads." [underscoring added]

ASSIGNING SOME DOSE TO EACH FILM BADGE REPORTED TO HAVE READ ZERO

DOD indicates that, in the extremely low dose ranges, the recorded exposures are only approximations of the true dose. However, DOD states it is also clear that a specific effort was made to distinguish between low exposures and zero exposures. Therefore, it would be wrong to elevate all Crossroads zero exposures to 0.05 or 0.1 rem. Such a policy, according to DOD, would be contrary to the practice of the health physics profession.

GAO spoke with 3 film badge experts on this subject. They were Mr. Jay Brady, Reynolds Electrical and Engineering Company, Dr. Margarite Uhrlich, U.S. National Bureau of Standards, and Dr. Allan Brodsky, U.S. Nuclear Regulatory Commission. Each individual told GAO it would be prudent to assign some amount of radiation, given the inability of the Crossroads film badge to accurately or detectably record radiation below 0.05 rem, to each film badge that was reported to have read zero. Dr. Brodsky further said that, over a period of time, the undetectable dose associated with each film badge could add up to a significant dose amount if a number of film badges were worn. In addition, Dr. Uhrlich said that whether to assign some dose to each film badge reported to have read zero was not up to the health physicist or the health physics profession but rather up to the organization receiving and recording the dose information.

Senator **Cranston**. On page 8 of your statement, you note that 'comprehensive personnel decontamination procedures were instituted about 3 weeks after the Shot Baker detonation. On what material do you base your satisfaction that such comprehensive procedures were in fact instituted, that is, put into effect with some degree of success, rather than merely established by a written guidance order?

Mr. **Fultz**. We can supply that in detail for the record if you would like.

Senator **Cranston**. I would appreciate that.

[The following information was supplied for the record:]

Crossroads records indicate that, on August 13, 1946, the commander of the Crossroads joint task force established, by memorandum, a central change station on the U.S.S. *Geneva* for the processing of all working parties proceeding to and from work on target ships. Subsequently, on August 30, 1946, the commander of the Crossroads target ship group indicated, by memorandum, that a central change station—similar to that existing on the U.S.S. *Geneva*—would also be established for crews reboarding Crossroads target ships at Kwajalein Island to offload ammunition. Other than evidence contained in these memoranda, GAO found no information on when a central change station was established and, once established, how effectively it was operated.

Senator **Cranston**. Mr. Chairman, I think I have used my 10 minutes, so I will subside to give others an opportunity.

Chairman **Murkowski**. Thank you very much.

Senator **Cranston**. I do have a few more questions.

Chairman **Murkowski**. I have one brief question as a consequence of the testimony.

I think you made reference in your report to Dr. Conard's view that beta radiation causes or is a cause of skin cancer; is that correct?

Mr. **Baney**. Well, let us review the issue that we are talking about. It is in respect to external beta radiation exposure.

With respect to the records at Operation Crossroads, for a period of time they stopped recording for external beta radiation exposure. We pointed that out in our report and asked that the DNA go back, revisit the information, and recalculate the external beta radiation exposure.

DNA in their comments to us said there is no necessity to do that, because there is no long-term health effects from external beta radiation.

Well, we talked with two experts in the area of the medical effects of radiation exposure, Dr. Conard, who is formerly with the Brookhaven National Laboratory, and Dr. David Kocher, who is with the Oak Ridge National Laboratory, and both indicated that external beta radiation may cause skin cancer. For that reason, we have stayed with our recommendation that further work needs to be done in this area.

Chairman **Murkowski**. Well, you say, may cause it, and you did talk to Dr. Conard?

Mr. **Baney**. I think with respect to Dr. Kocher, he elaborated on that. He said that the evidence with respect to external beta radiation and what it may cause has not been established one way or the other. Further experimentation needs to be done. He said that as a conservative assumption, people involved in the field assume that it may cause skin cancer.

Chairman **Murkowski**. What I'm getting at, though, is, A, did you talk to him and in your report refer to his view that beta radiation causes skin cancer. Because I understand that Dr. Conard's testimony says he saw no military personnel with high level beta radiation exposure.

My question is an obvious one. Is there an inconsistency in that?

Mr. **Baney**. No; there is not. I explored with Dr. Conard what position he was in at Operation Crossroads. I found in the documentation and in talking with him that he was in the plotting section of the radiological safety section, as far as plotting where the radiation was in the Bikini Lagoon. He was not per se in a position to know the amount of radiation being received by the participants at Operation Crossroads.

Nonetheless, he pointed out one example of an extreme beta radiation exposure that he saw. This involved an airman handling the radiological filter from a drone aircraft that had soon flown by the radioactive cloud after Test Baker. He said this person who handled this filter did receive an extreme beta radiation exposure.

Chairman **Murkowski**. I will pursue this line of questioning with Dr. Conard.

I have no further questions.

Senator Rockefeller, who has joined us, do you have any statement or observations?

Senator **Rockefeller**. Would it be appropriate, Mr. Chairman, to give a statement?

Chairman **Murkowski**. It would be appropriate. We are moving along rather slowly and have many witnesses, so we would appreciate brevity if you are so inclined.

Senator **Rockefeller**. And my statement is brief.

Chairman **Murkowski**. Please proceed.

OPENING STATEMENT OF SENATOR ROCKEFELLER

Senator **Rockefeller**. Thank you very much, Mr. Chairman.

I have come to the conclusion that Senator Paul Simon's Senate bill 707, the Atomic Veterans Relief Act, should be enacted. I have become a cosponsor of that legislation, and I will work with my colleagues to try to assure its passage.

I understand that Senator Simon is amenable to changes in the bill, but I join him in believing that it is time for the Federal Government to accept a greater sense of obligation toward the individuals who served their country by participating in nuclear tests. As each day passes, the atomic veterans grow older. Their ranks are decreasing because of the reality that some are dying each year.

I am sure that almost none of these veterans regret answering the call of duty. In fact, I doubt any of them do. However, they have a right to question whether justice is being performed in addressing their concerns. We know how many were exposed to high levels of radiation, and we know that many of these veterans have been plagued with health problems. I believe it is America's duty to accept an obligation to compensate those who ask for relief.

A number of West Virginia's atomic veterans took the time to drive to Washington to attend this hearing, Mr. Chairman, and I'm very grateful to them for that. Herb Holmes, Ted Wolf and Harold

Lloyd are all from the Clarksburg area. Mr. Holmes is the State coordinator of the National Association of Atomic Veterans. Mr. Carper, whom I will speak about in a moment, and Mr. Haynes are both from Charles Town.

Not all of West Virginia's atomic veterans, perhaps, will be seeking anything in the way of compensation. On the other hand, many of my State's atomic veterans do believe their health problems are the result of their participation in nuclear testing. I feel a responsibility to ensure that the veterans who have been affected by exposure to radiation will obtain the justice that I feel that they deserve.

I would like to specifically point out Mr. W.R. Carper from Charles Town, WV. Mr. Carper, at the age of 19, was part of the Navy crew that performed salvage duties at Crossroads. In 1946 for several months he removed material from ships after the bombs had detonated. He recalls only this about possible dangers involved in this activity. An individual who was known as the "Geiger Man" accompanied the salvage crew and reported whether the area on the ship was hot or not hot. In addition, Mr. Carper remembers receiving two instructions concerning how to protect himself. He was told to take a shower, and he was told to clean his clothes after returning with the salvage crew to his home ship or to the shore. Not adequate.

I share with my distinguished colleagues the desire to conduct the necessary research to make the most informed possible judgment about all of this, but I sincerely believe that we should also consider whether this is the time to decide to pass legislation to provide them with instant relief. I have decided now is the time.

I see no reason for another time. Already all of these years have passed, starting back in 1946. What are we waiting for? And as I say, if you go to bed at night and there is no snow on the ground, and you wake up in the morning and there is snow on the ground, that you cannot scientifically prove that it snowed, because you didn't see it. But the snow is on the ground. The cancer is in the veterans' bodies. The time is now to help our atomic veterans.

I thank the chairman.

Chairman **Murkowski**. Thank you for your statement, Senator Rockefeller.

And knowing of the sensitivity that was brought up—with regard to cameras in the hearing room—we have made inquiries today on the presence of the cameras. One of the cameras represents one of the small cable networks, and the other, we understand, is at the request of a member of the committee.

Senator **Rockefeller**. Yes, and that is correct, Mr. Chairman, as opposed to the last time that we discussed this subject, the camera, at least one of those cameras in question, will be covering the witnesses as extensively as they will be covering the members of the committee. I feel that ignoring the witnesses is the moral issue, as I described quite clearly in our last meeting.

Chairman **Murkowski**. As I indicated to you at that time, I felt it appropriate. That all members be advised as to just who the cameras represent, and that is a commitment being maintained by myself as chairman of the committee.

Senator **ROCKEFELLER**. That is good, and this will be the second time that that commitment has been maintained.

Chairman **MURKOWSKI**. And then we will go on to the third time at some future——

Senator **ROCKEFELLER**. Good. All right.

Chairman **MURKOWSKI**. I think, unless you have further questions——

Senator **CRANSTON**. I have just a few more.

Chairman **MURKOWSKI**. Please proceed.

Senator **CRANSTON**. A very few more.

It is my understanding that before a target ship was reboarded, it was first hosed down from a support ship. According to DNA, this process would remove most or all of the radiation that could be easily dislodged, leaving only radiation that would be unlikely to come off onto the clothing or skin surfaces of the personnel who then boarded the target ships.

Do you agree with that?

Mr. **BANEY**. We do not. Apparently, the attempts at decontamination of target ships were not entirely successful. DNA, in its historical report, acknowledges that and states:

> In most cases, dangerous contamination remained even after strenuous decontamination efforts. Some ships were badly contaminated below decks, and the task force had no way to deal with this, and no practical method had been found to decontaminate wooden or rusty surfaces short of removing the contaminated outer layer of the material.

Moreover, the DNA report states that even after repeated washings, decks and ships remained contaminated to levels between 1 and 10 rem per day.

Senator **CRANSTON**. In a statement submitted for today's hearings, Dr. Makhijani, one of the individuals who prepared an analysis of the Warren papers in 1983, commented on your report and made some further points regarding Operation Crossroads, as to which I would appreciate your views.

On page 3 of his statement, he discusses the concern that because of wide variations in individuals' duties at Operation Crossroads, there could be wide variations in their exposure. He points out, however, that because there is not reliable detailed record of either the specific duration of a particular individuals activities or of the distribution of contamination on the target ships, it is not possible to establish the magnitude of the potential variations.

Do you agree with that?

Mr. **BANEY**. Absolutely so.

In a memo by Dr. Stafford Warren, who was head of the radiological safety section, dated August 7, 1946, he stated because of the wide variation in the radiation readings aboard the target ships, it was not possible to estimate any one individual's exposure on board a target ship because you did not know where that person was at or where he might have lingered while he was aboard the ship.

Senator **CRANSTON**. Thank you very much.

In discussing film badge readings at Operation Crossroads, Dr. Makhijani indicates that there are crucial periods during which one enlisted man working under great pressure did the badge readings.

Would you comment on that assertion?

Mr. Baney. That is exactly what we found. As of August 7, 1946, also, the records indicate that the dosimetry section had been reduced to one enlisted man, and based upon available information, that enlisted man had to work long hours to keep up with the workload as far as the film badge processing. Whether or not he was able to accurately do that film badge processing given the workload is anyone's guess.

Senator Cranston. What exactly were the time pressures and what was the technical training?

Mr. Baney. Information only suggests that he was trained to do the job of film badge dosimetry. It does not indicate that he was an expert in the field, only that he had been trained to do film badge dosimetry.

Senator Cranston. What about the time pressures? What were they, exactly?

Mr. Baney. Well, again, they were interested in processing the film badges in 1 day's time to determine how much radiation exposure an individual did receive, so in case he had received an overexposure, they could remove him from the operation for a couple days to prevent his further exposure to radiation. So they were interested in doing the processing on a day-to-day basis.

Senator Cranston. Dr. Makhijani, in discussing exposure to beta radiation, states:

> The film badge records show readings of zero beta radiation in the very period when Colonel Warren noted that it was exceedingly common for personnel to be subjected to doses of beta radiation above the established tolerance of .5 rad per day.

Would you comment on that?

Mr. Baney. That is exactly the case. In the August 7 memo again, Dr. Warren is making a strong case in the memo he is writing to the commander of the joint task force conducting Operation Crossroads for terminating the operations. One of the examples that he uses as far as a reason to terminate the operations and terminate the operations soon was because of increasing evidence that people were being exposed to beta radiation, on their skin, hands, and faces also, in increasing amounts day by day. He was recommending that the operation be terminated soon.

Senator Cranston. Frank, that concludes my questions.

I want to thank you once again for a very fine report, and I applaud your great preparation and mastery of the facts for today's hearing. Thank you very much.

Chairman Murkowski. Thank you, Senator Cranston.

Mr. Baney. Thank you.

Mr. Fultz. Thank you, sir.

Chairman Murkowski. Senator Rockefeller, do you have any questions?

Senator Rockefeller. I want to just ask two very quick questions, Mr. Chairman.

If there are approximately 42,000 military personnel who participated in those two bomb tests, Crossroads, are you, or do you know how many of those folks are alive today?

Mr. Baney. We have not done that work. You are talking about doing some type of an epidemiological study as far as determining the death or the health status of those participants. We have not done that.

Mr. FULTZ. We have not.

Senator ROCKEFELLER. But in terms of being alive or dead, that has not been done? Is that difficult to do?

Mr. BANEY. That is not difficult to do, no.

Senator ROCKEFELLER. Would that be possible to do?

Mr. BANEY. Yes.

Senator ROCKEFELLER. I would be interested.

Mr. FULTZ. I think that question, sir, could be presented to DOD or DNA.

Senator ROCKEFELLER. All right. What do you think the cost would be if DNA were to carry out your recommendations?

Mr. BANEY. I believe that question should be asked of them. We have no idea of that.

Senator ROCKEFELLER. All right. I will do that.

Thank you.

Chairman MURKOWSKI. Thank you, Senator——

Senator CRANSTON. I asked Mr. Walters to make a study on that very topic, how many of those veterans are now living.

Chairman MURKOWSKI. That is what we have asked the Veterans' Administration——

Senator ROCKEFELLER. All right. Thank you, Mr. Chairman.

Chairman MURKOWSKI [continuing]. To establish a formal registry—which has never been done for reasons that I could not begin to explain to you because, as you have pointed out—it is the first thing that came to my mind. And they do not have it. So hopefully.

Thank you, gentlemen. I want to summarize by indicating that from implications of your testimony, you indicate that GAO does not know whether indeed the levels that were received by Operation Crossroads participants were sufficiently higher than DNA has estimated. But that is the purpose of your following report, which we understand will be available in May, it will be definitive in the sense of addressing the unknowns that you have found in your current report.

Again, I want to emphasize that this committee and its members stand ready to assist you in your process and procedure to achieve a report that this committee can deliberate on and initiate appropriate actions therefrom.

Mr. FULTZ. Sir, my staff, and I will be meeting with your staff very soon to discuss the specifics of your request.

Chairman MURKOWSKI. We appreciate your testimony and wish you a good day and a happy holiday season.

Mr. FULTZ. Thank you.

Mr. BANEY. Thank you.

Chairman MURKOWSKI. Our next witnesses will be Lt. Gen. John Pickett, Director, who will be accompanied by Mr. Robert L. Brittigan, General Counsel, and Dr. C.M. Gillespie, Assistant for Testing to the Deputy Director for Science and Technology, Defense Nuclear Agency in Washington, DC.

Gentlemen, we wish you a good day. We look forward to your testimony. I would remind you that we do have time limitations which we are imposing.

[Pause.]

Chairman MURKOWSKI. You may proceed at your call, gentlemen.

STATEMENT OF LT. GEN. JOHN L. PICKITT, DIRECTOR, DEFENSE NUCLEAR AGENCY, ACCOMPANIED BY ROBERT L. BRITTIGAN, GENERAL COUNSEL; AND DR. C.M. GILLESPIE, ASSISTANT FOR TESTING TO THE DEPUTY DIRECTOR FOR SCIENCE AND TECHNOLOGY

General PICKITT. Thank you, sir.

Good morning, Mr. Chairman, members of the committee. I am Lt. Gen. John L. Pickitt, Director of the Defense Nuclear Agency, and Executive Agent for the Department of Defense Nuclear Test Personnel Review Program.

I am accompanied today by DNA's General Counsel, Robert L. Brittigan, and the senior scientist responsible for the NTPR Program, Dr. C.M. Gillespie.

Dr. Gillespie participated in a number of atmospheric nuclear tests as a member of the Air Force, and is in charge of DNA's current underground nuclear test program.

We are pleased to have this opportunity to discuss the recent General Accounting Office report concerning personnel radiation exposure estimates for Operation Crossroads. We strongly disagree with most of GAO's conclusions and submitted extensive comments on the draft of the report. These comments were not accepted by GAO. I have addressed our differences on the most important issues in some detail in prepared testimony.

The Department of Defense established the NTPR Program in 1978 when a preliminary report by the Centers for Disease Control indicated a possible excess of leukemias among veterans of one of the atmospheric nuclear tests. Since that time, we have expended more than 1,000 man-years of effort and $54 million to ascertain the facts.

The NTPR Program has accomplished a great deal over the past several years. These accomplishments are summarized in my prepared testimony and in the attached fact sheets.[1] One of the most critical elements of the program has been the Department of Defense effort to recover or reconstruct the radiation doses to which each of the veterans who participated in the atmospheric nuclear tests had been exposed. From the outset of the program, the Department of Defense has been committed to determining the most scientifically sound and accurate estimate possible for each participant.

I believe that DNA has adhered to that commitment.

Where the exposure estimates were high, we reported the high doses. When new data became available, as it did with respect to Operation Crossroads, we recalculated the exposure estimates even though the original estimates were low and we knew that the recalculation would also result in medically insignificant estimates. In every case, we have meticulously reviewed available records and used the methodology most appropriate for the available data.

In that regard, it should be noted that our current estimates for Operation Crossroads participants show that 7,500 men were not exposed to any radiation at all. The average exposure to the 42,000 Crossroads personnel was about 0.4 rem. To put this in perspective, the current standard for annual occupation exposure is 5.0 rem, more than 10 times the average exposure during Crossroads.

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[1] See p. 419.

The current standards for annual exposure to the general public is 0.5 rem, and the exposure we all receive each year from natural background radiation is 0.1 rem at sea level, and 0.2 rem at higher elevations such as Denver, CO.

Turning now to the GAO report, it should be noted that DNA received the final report only 1 week ago, and that further comments will undoubtedly be included in the Defense Department formal response to be provided within the 60-day comment period allocated for such GAO final reports.

DNA and GAO disagree on four principal points with respect to the Crossroads dose estimates. The first concerns film badge accuracy. DNA has concluded that the intrinsic accuracy of the film badges used at Operation Crossroads was within plus or minus 30 percent. GAO does not dispute that conclusion, but insists, based upon laboratory tests which were done several years later, that errors in processing could have increased the margin of error to as much as plus or minus 100 percent. These later laboratory tests were subject to several problems that were not present at Crossroads, and demonstrate at most that film processing can either be performed quite well or quite poorly.

GAO acknowledges that the procedures in place at Crossroads were proper and Dr. Dessauer, the chief of photo dosimetry at Crossroads, has stated in the affidavit attached to my prepared testimony that these procedures were followed. Moreover, control samples were processed with each batch of Crossroads films as the films were developed. Accordingly, any errors in processing would have been self-correcting.

Chairman MURKOWSKI. You may continue. Please proceed.

General PICKITT. GAO also asserts that readings below 0.05 rem, including zero readings, should be reported as readings of 0.05 rem because the badges used at Crossroads had a range of only from 0.05 rem to two rem. DNA must reject this suggestion, because both the ledgers and Dr. Dessauer's affidavit demonstrate that readings could be made and were made as low as 0.01 rem.

Finally, with respect to the question of environmental damage, DNA remains convinced that such damage to the films would have resulted in overstatement of the dosages rather than understatement of the exposures.

Our second major disagreement pertains to personal decontamination procedures employed by personnel who boarded contaminated target vessels. We believe that the approximately 400 persons who boarded target vessels prior to August 1, 1946, had sufficient training and experience to protect themselves, and that the regulation promulgated on July 31, 1946, assured the protection of the approximately 9,000 persons who, thereafter, boarded the vessels.

The third disagreement, and probably the most important, involves possible internal doses. GAO and DNA agree that there are three means by which an individual can receive internal contamination. With regard to inhalation, GAO's criticism is that DNA calculated the amount of radiation available for resuspension and inhalation based on radiochemical analysis from cloud debris and samples taken on September 6, 1946. GAO would prefer to use data collected several months later after the ships had undergone extensive decontamination and had sailed from Bikini to the west coast. We believe sound scientific judgment requires use of the contemporaneous data.

With respect to ingestion, GAO suggests that the worst-case analysis performed by DNA did not postulate a true worst case. When we performed the calculations for a different case which was suggested as being worse by GAO, we found that the potential for ingestion was less than it had been in the DNA model.

Finally, with regard to contamination through wounds, GAO argues that sailors could have received wounds worse than the wound considered by DNA. We disagree that such could be the case, with respect to any significant number of personnel, because we reviewed more than 35,000 medical records and found no mention of wounds.

It should be noted in connection with both inhalation and ingestion models that the NTPR Program accepts the information provided by veterans unless it is demonstrably false. Accordingly, if any veteran presents information which would warrant assignment of a higher internal dose, the higher dose will be assigned.

The fourth major disagreement between GAO and DNA pertains to the potential for external beta contamination. GAO places great emphasis on the fact that beta radiation can penetrate tissue to a distance of a half inch, and thereby poses a threat to organs near the surface of the skin such as the eyes and male gonads. While this is true, it is not relevant. In order to expose any organ one half inch deep to as much as one rem of beta radiation, the surface of the skin would have to be exposed to thousands of rem beta. Any external dose approaching that level would be associated with severe beta burns requiring immediate medical attention and probably a lethal or near-lethal dose of gamma radiation. We know from our review of the records, our interviews with participants, the available measurement data, and our calculation that no such event occurred.

We have noted that most of the areas in which GAO and DNA disagree involve the exercise of technical expertise, scientific judgment, and methodology. DNA has always sought appropriate scientific peer review of agency work to ensure that we did not commit an error that would penalize a veteran. DNA will continue to seek out and apply any sound suggestions or criticism which we receive.

At the request of DNA and the Department of Energy, the National Academy of Sciences performed an extensive mortality study of atmospheric nuclear test participants. After studying more than 50,000 veterans, approximately one quarter of the participants, the National Academy concluded that "nuclear test veterans had a lower overall incidence of death, and in particular, a lower incidence of death from radiogenic diseases than the general public."

In conclusion, I would like to state that our concern has always been with the welfare of the veteran. The reason the NTPR Program was established was because of the fear that veterans might have been placed at increased risk of disease as a result of their participation in the atmospheric nuclear tests.

Gentlemen, as you can see, the results of the National Academy of Sciences studies correlate with the dosage assignments from the NTPR Program.

This concludes my formal testimony. We would be happy to answer any questions that you might have.

[The prepared statement of General Pickitt follows:]

PREPARED TESTIMONY OF LT GEN JOHN L. PICKITT

DIRECTOR, DEFENSE NUCLEAR AGENCY

MR. CHAIRMAN, MEMBERS OF THE COMMITTEE, I AM LT GEN JOHN L. PICKITT, DIRECTOR OF THE DEFENSE NUCLEAR AGENCY, (DNA) AND THE EXECUTIVE AGENT FOR THE DEPARTMENT OF DEFENSE (DOD) NUCLEAR TEST PERSONNEL REVIEW (NTPR) PROGRAM. I AM ACCOMPANIED TODAY BY DNA'S GENERAL COUNSEL, MR. ROBERT L. BRITTIGAN, AND THE SENIOR SCIENTIST RESPONSIBLE FOR THE NTPR PROGRAM, DR. C. M. GILLESPIE. DR. GILLESPIE PARTICIPATED IN A NUMBER OF ATMOSPHERIC NUCLEAR TESTS AS A MEMBER OF THE AIR FORCE AND IS IN CHARGE OF DNA'S CURRENT UNDERGROUND NUCLEAR TEST PROGRAM.

I AM PLEASED TO HAVE THIS OPPORTUNITY TO DISCUSS THE RECENT GENERAL ACCOUNTING OFFICE (GAO) REPORT CONCERNING THE PERSONNEL RADIATION EXPOSURE ESTIMATES FOR OPERATION CROSSROADS. BEFORE ADDRESSING THE SPECIFICS OF THE GAO REPORT, I WOULD LIKE TO BRIEFLY SUMMARIZE THE PROGRESS WE HAVE MADE TO DATE IN THE NTPR PROGRAM.

THE NTPR PROGRAM WAS INITIATED IN 1978 AFTER A PRELIMINARY REPORT BY THE CENTERS FOR DISEASE CONTROL INDICATED THAT THERE WAS AN INCREASED INCIDENCE OF LEUKEMIA AMONG VETERANS WHO PARTICIPATED IN SHOT SMOKY, WHICH WAS CONDUCTED AT THE NEVADA TEST SITE IN 1957. THE MISSION OF THE NTPR PROGRAM IS TO:

- IDENTIFY THE APPROXIMATELY 200,000 DOD PARTICIPANTS AND DETERMINE THEIR EXPOSURES.
- PROVIDE ASSISTANCE TO VETERANS AND THE VETERANS ADMINISTRATION ON CLAIMS FOR COMPENSATION.

- SPONSOR STUDIES TO ASCERTAIN WHETHER TEST PARTICIPANTS EXPERIENCED ANY UNUSUAL INCIDENCES OF DEATH OR ILLNESS.
- NOTIFY VETERANS OF VETERANS ADMINISTRATION BENEFITS AND DEPARTMENT OF DEFENSE ASSISTANCE.
- DECLASSIFY TEST RELATED DOCUMENTS AND PUBLISH HISTORICAL REPORTS COVERING DOD ACTIVITIES AT THE TESTS.

SINCE THE INCEPTION OF THE PROGRAM, THE DEPARTMENT OF DEFENSE HAS EXPENDED MORE THAN 1000 MAN YEARS OF EFFORT AND $54 MILLION TO ASCERTAIN THE FACTS. THE EFFORT HAS BEEN COMPLICATED BY THE FACT THAT RECORDS MAINTAINED DURING THE TESTS ARE NOT AS COMPLETE AS WE WOULD LIKE, AND HAVE, OVER SEVERAL DECADES, BEEN DISTRIBUTED AMONG A LARGE NUMBER OF REPOSITORIES, LOST, OR DESTROYED. NEVERTHELESS, WE HAVE ACCOMPLISHED A GREAT DEAL. SPECIFICALLY:

- NTPR HAS, THUS FAR, IDENTIFIED 165,000 OF THE ESTIMATED 200,000 DOD PARTICIPANTS AT THE TESTS. IN ADDITION, WE HAVE RECOVERED OR RECONSTRUCTED RADIATION EXPOSURE FOR 160,000 OF THE PARTICIPANTS. IN THE COURSE OF OUR RESEARCH WE DISCOVERED THAT, IN GENERAL, THE EXPOSURES WERE QUITE LOW. THE AVERAGE EXPOSURE WAS ABOUT 0.5 REM GAMMA. FEDERAL GUIDELINES PERMIT OCCUPATIONAL EXPOSURES OF UP TO 5.0 REM GAMMA PER YEAR. LESS THAN 1% OF THE APPROXIMATELY 200,000 PARTICIPANTS HAD EXPOSURES EXCEEDING 5.0 REM. WITH RESPECT TO PARTICIPANTS AT OPERATION CROSSROADS, THE RADIATION EXPOSURES WERE LOW. OF THE 42,000 PARTICIPANTS IN CROSSROADS, APPROXIMATELY 7,500 MEN WERE NOT EXPOSED TO ANY RADIATION AT ALL. THE

AVERAGE EXPOSURE TO THE 42,000 CROSSROADS PERSONNEL WAS ABOUT 0.4 REM. TO PUT THIS IN PERSPECTIVE, THE CURRENT STANDARD FOR ANNUAL OCCUPATIONAL EXPOSURE IS 5.0 REM, THE CURRENT STANDARD FOR ANNUAL EXPOSURE TO THE GENERAL PUBLIC IS 0.5 REM AND THE EXPOSURE WE ALL RECEIVE EACH YEAR FROM NATURAL BACKGROUND RADIATION IS 0.1 REM AT SEA LEVEL AND 0.2 REM AT HIGHER ALTITUDES SUCH AS DENVER, COLORADO.

- NTPR PROVIDES SPECIAL RESEARCH ASSISTANCE TO THE VETERANS ADMINISTRATION FOR COMPENSATION CLAIMS.
- DNA ASSISTED THE CENTERS FOR DISEASE CONTROL AND PARTIALLY FUNDED THE NATIONAL ACADEMY OF SCIENCES STUDIES OF THE ATMOSPHERIC TEST PARTICIPANTS. THE RESULTS OF THESE STUDIES ARE DISCUSSED LATER IN THIS STATEMENT.
- DNA MAINTAINS A TOLL-FREE TELEPHONE LINE (800-336-3068) TO ENCOURAGE PARTICIPANTS TO CONTACT US. WE HAVE ADVERTISED THIS NUMBER AT EVERY AVAILABLE OPPORTUNITY, INCLUDING PRESS RELEASES TO MEDIA SOURCES THROUGHOUT AMERICA. TO DATE, APPROXIMATELY 52,000 PARTICIPANTS HAVE CONTACTED DNA. AFTER THEIR PARTICIPATION IS CONFIRMED AND THEIR DOSE DETERMINED ALL DOD PARTICIPANTS ARE SENT A LETTER DETAILING THIS INFORMATION FOR THEIR RETENTION. IN ADDITION, CALLERS TO THE TOLL-FREE LINE ARE PROVIDED WITH ANSWERS TO BASIC QUESTIONS SUCH AS HOW TO OBTAIN DOCUMENTS OR FILE AN ADMINISTRATIVE CLAIM FOR COMPENSATION WITH THE VETERANS ADMINISTRATION.

MOREOVER, DNA HAS CONDUCTED TWO SPECIAL MASS MAIL-OUTS TO THE VETERANS WHO HAVE CALLED NTPR. FINALLY, NTPR HAS ATTEMPTED TO LOCATE AND NOTIFY ALL DOD TEST PARTICIPANTS WHO RECEIVED EXPOSURES GREATER THAN 5 REM GAMMA PER YEAR. THESE VETERANS ARE ENCOURAGED TO UNDERGO A SPECIAL PHYSICAL EXAMINATION AT THE NEAREST VA HOSPITAL. THE RESULTS OF THE PHYSICALS INDICATE THAT THIS GROUP IS IN BETTER HEALTH THAN THE GENERAL PUBLIC.

* DNA AND THE DEPARTMENT OF ENERGY HAVE DECLASSIFIED 891 TECHNICAL REPORTS AND PUBLICATIONS WHICH DEAL DIRECTLY WITH THE ATMOSPHERIC NUCLEAR TESTS. THESE DOCUMENTS ARE AVAILABLE FOR REVIEW AT THE LIBRARY OF CONGRESS OR AT THE DEPARTMENT OF ENERGY'S PUBLIC ARCHIVES OF ATMOSPHERIC NUCLEAR TESTING, THE COORDINATION AND INFORMATION CENTER (CIC), LAS VEGAS, NEVADA ALSO, THESE DOCUMENTS MAY BE PURCHASED FROM CIC OR THE NATIONAL TECHNICAL INFORMATION SERVICE. IN ADDITION TO THESE PUBLICATIONS, DNA DECLASSIFIES THOUSANDS OF SMALLER SIZE DOCUMENTS (MEMORANDA, SHORT REPORTS, ETC.) AND MAKES THEM AVAILABLE TO CIC. PRESENTLY, CIC HAS APPROXIMATELY 125,000 ATMOSPHERIC NUCLEAR TEST RELATED DOCUMENTS. EVENTUALLY, THE PUBLIC ARCHIVE WILL HOUSE ABOUT 200,000 DOCUMENTS. AS A COMPLEMENT TO THE DOCUMENT DECLASSIFICATION PROGRAM, DNA HAS PUBLISHED A 41

> VOLUME, 9029 PAGE PERSONNEL ORIENTED HISTORY OF THE ATMOSPHERIC NUCLEAR TESTS. THIS EFFORT WAS ONE OF THE LARGEST HISTORICAL RESEARCH PROJECTS EVER UNDERTAKEN CONCERNING PEACETIME DOD ACTIVITIES. THESE VOLUMES ARE AVAILABLE AT THE LIBRARY OF CONGRESS, CIC, THE NATIONAL TECHNICAL INFORMATION SERVICE, ALL VA REGIONAL OFFICES, AND MORE THAN 700 LIBRARIES NATIONWIDE.

ADDITIONAL INFORMATION CONCERNING THE STATUS OF THE NTPR PROGRAM CAN BE FOUND IN THE ATTACHED NTPR FACT SHEET (ENCLOSURE 1).

ONE OF THE MOST CRITICAL ELEMENTS OF THE PROGRAM HAS BEEN OUR EFFORT TO RECOVER OR RECONSTRUCT THE RADIATION DOSES TO WHICH EACH OF THE VETERANS WHO PARTICIPATED IN THE ATMOSPHERIC NUCLEAR TESTS MAY HAVE BEEN EXPOSED. MOST OF OUR EFFORT AND DOLLARS HAVE BEEN DIRECTED TO RECOVERY AND REVIEW OF ALL AVAILABLE HISTORICAL DOCUMENTS, INTERVIEWS WITH RESPONSIBLE OFFICIALS, ANALYSIS OF AVAILABLE DATA, AND DETERMINATION OF TOTAL RADIATION EXPOSURE. FROM THE OUTSET OF THE PROGRAM WE HAVE BEEN COMMITTED TO DETERMINING AND REPORTING THE MOST SCIENTIFICALLY SOUND AND ACCURATE ESTIMATE POSSIBLE FOR EACH PARTICIPANT. I BELIEVE WE HAVE ADHERED TO THAT COMMITMENT. WHEN THE EXPOSURE ESTIMATES WERE HIGH, AS THEY WERE FOR SOME PARTICIPANTS IN OPERATION CASTLE-BRAVO AND SOME OF THE AIR CREWS WHO PARTICIPATED IN CLOUD SAMPLING, WE REPORTED THE HIGH DOSE. WHEN NEW DATA BECAME AVAILABLE, AS IT DID WITH RESPECT TO OPERATION CROSSROADS, WE RECALCULATED THE EXPOSURE ESTIMATES EVEN THOUGH THE ORIGINAL ESTIMATES WERE LOW AND WE KNEW THAT THE RECALCULATION WOULD ALSO

RESULT IN LOW ESTIMATES. IN EVERY CASE WE HAVE METICULOUSLY REVIEWED THE AVAILABLE RECORDS, AND USED THE METHODOLOGY MOST APPROPRIATE FOR THE AVAILABLE DATA.

THROUGHOUT OUR DOSE RECONSTRUCTION EFFORT WE HAVE ACTIVELY SOUGHT APPROPRIATE PEER REVIEW. AS WE DEVELOPED THE DOSE RECONSTRUCTION METHODOLOGY AND ANALYZED THE ASSUMPTIONS WHICH HAD TO BE MADE IN THE ABSENCE OF COMPLETE DATA, WE CONTACTED DISTINGUISHED SCIENTISTS AND THE OFFICIALS WHO WERE RESPONSIBLE DURING THE TESTS AND SOLICITED THEIR VIEWS. VALID SUGGESTIONS AND COMMENTS WERE INCORPORATED INTO THE PROGRAM AND I AM HAPPY TO NOTE THAT NO UNFAVORABLE COMMENTS FROM THESE SCIENTISTS AND OFFICIALS REMAIN UNRESOLVED. AS A FURTHER CHECK, IN 1982 WE ASKED THE NATIONAL ACADEMY OF SCIENCES TO REVIEW OUR DOSE RECONSTRUCTION METHODOLOGY. THE ACADEMY ASSEMBLED A PANEL OF PHYSICISTS, BIOLOGISTS, HEALTH PHYSICISTS, FILM BADGE AND DOSIMETRY EXPERTS, AND OTHER SCIENTISTS, SOME OF WHOM PARTICIPATED IN ATMOSPHERIC NUCLEAR TESTS. THE PANEL SPECIFICALLY INCLUDED THE ISSUES OF FILM BADGE ACCURACY AND CROSSROADS DOSE RECONSTRUCTIONS IN ITS REVIEW. AS I INDICATED IN MY RECENT LETTER TO SENATOR CRANSTON, THE ACADEMY EXPECTS TO PUBLISH THE RESULTS OF THEIR REVIEW SOON.

WE HAVE ALSO SOUGHT INPUT FROM THE PUBLIC AND FROM CONCERNED VETERANS. ON MAY 9, 1985 DNA PUBLISHED A PROPOSED AMENDMENT TO OUR DOSE RECONSTRUCTION METHODOLOGY IN THE FEDERAL REGISTER FOR PUBLIC COMMENT. WE CAREFULLY CONSIDERED EACH OF THE COMMENTS WE RECEIVED AND, ON OCTOBER 21,1985, PUBLISHED A FINAL RULE SETTING FORTH THE DNA METHODOLOGY. A COPY OF THE RULE IS ATTACHED

AT ENCLOSURE 2.

TURNING NOW TO THE GAO REPORT, I MUST ADMIT THAT I AM A LITTLE PUZZLED AS TO WHAT GAO BELIEVED IT WAS DOING. ON PAGE 18 OF THEIR REPORT, GAO STATED THAT IN VIEW OF THE ONGOING REVIEW BY THE NATIONAL ACADEMY OF SCIENCES, THEY WERE NOT REVIEWING THE DNA METHODOLOGY. THE AREAS IN WHICH WE DISAGREE, HOWEVER, ARE LARGELY ENCOMPASSED WITHIN THE METHODOLOGY. I WILL COMMENT ON THIS IN MORE DETAIL LATER.

DNA AND GAO DISAGREE ON FOUR PRINCIPAL POINTS WITH RESPECT TO THE CROSSROADS DOSE ESTIMATES. DOD SUBMITTED DETAILED COMMENTS ON THE DRAFT GAO REPORT WHICH ARE REPRINTED AT PAGES 70-101 OF THE REPORT. THESE COMMENTS, WHICH WERE NOT ACCEPTED BY GAO, NEED NOT BE REITERATED HERE. SIMILARLY, IT DOES NOT APPEAR THAT ANY USEFUL PURPOSE WOULD BE SERVED BY SPECIFICALLY ADDRESSING EACH OF THE 34 COMMENTS MADE BY GAO WITH RESPECT TO THAT SUBMISSION. IT IS IMPORTANT, HOWEVER, TO BRIEFLY EXPLAIN WHY WE ADHERE TO THE VIEW THAT THE DNA DOSE RECONSTRUCTION METHODOLOGY EMPLOYED FOR OPERATION CROSSROADS IS SOUND AND WHY WE REMAIN CONVINCED THAT THE GAO FINDINGS WITH RESPECT TO THE DOSE ESTIMATES ARE WITHOUT MERIT.

THE FIRST MAJOR DISAGREEMENT CONCERNS FILM BADGE ACCURACY. ALTHOUGH MANY DISTINGUISHED EXPERTS, INCLUDING THE SCIENTIST IN CHARGE OF PHOTODOSIMETRY AT OPERATION CROSSROADS, DR. GERHART DESSAUER, WHOSE STATEMENT IS ATTACHED AS ENCLOSURE 3, BELIEVE THAT THE INTRINSIC ACCURACY OF THE FILM USED AT CROSSROADS WAS BETTER THAN PLUS OR MINUS 30% EXCEPT AT INSIGNIFICANT LEVELS OF EXPOSURE, DNA HAS ESTIMATED THAT THE FILM COULD HAVE VARIED BY AS

MUCH AS PLUS OR MINUS 30%. GAO HAS NOT CONTESTED THIS ESTIMATE. HOWEVER, WE CANNOT ACCEPT GAO'S SPECULATION THAT ERRORS IN PROCESSING INCREASED THE POSSIBLE ERROR TO PLUS OR MINUS 100%. GAO BASED ITS SPECULATION UPON TESTS PERFORMED IN A NUMBER OF LABORATORIES SEVERAL YEARS AFTER OPERATION CROSSROADS AND THE ASSUMPTION THAT CROSSROADS FILM PROCESSING WAS CONDUCTED IN A "HARSH" ENVIRONMENT. THE WIDE VARIATIONS IN THE RESULTS OF THE TESTS RELIED UPON BY GAO ARE EXPLAINABLE FOR A NUMBER OF WELL DOCUMENTED REASONS NOT APPLICABLE TO CROSSROADS, INCLUDING THE FOLLOWING:

1. IN NO CASE WERE SAMPLE FILMS OF KNOWN EXPOSURE SUPPLIED TO THE LABORATORIES TO ACT AS PROCESS AND READING CONTROLS AND ALLOW CALIBRATION OF THE ENTIRE PROCESS AS WAS DONE AT CROSSROADS.

2. THE LABORATORIES BEING TESTED WERE NOT TOLD THE ENERGY SPECTRUM TO WHICH THE FILMS HAD BEEN EXPOSED. IN THE NBS TESTS THE LABORATORIES WERE TO DETERMINE NOT ONLY THE EXPOSURE LEVEL BUT THE SPECTRUM AS WELL.

3. USE OF ENERGY SPECTRA DIFFERENT FROM THE ENERGY SPECTRA WITH WHICH THE LABORATORIES WERE ACCUSTOMED TO READING FILMS.

4. USE OF FOUR DIFFERENT FILM TYPES AND THREE DIFFERENT TYPES OF HOLDERS, ALL DIFFERENT FROM THOSE USED AT CROSSROADS.

FURTHER, GAO HAS LUMPED TOGETHER THE RESULTS FROM MANY LABORATORIES TO REACH ITS CONCLUSIONS. A LOOK AT THE RESULTS FROM THE INDIVIDUAL LABORATORIES SHOWS A VERY DIFFERENT PICTURE, HOWEVER, SINCE IT IS CLEAR THAT SOME LABS DID WELL AND OTHERS DID VERY POORLY. THIS IS ILLUSTRATED IN ENCLOSURE 4 WHICH COMPARES THE ACTUAL FILM EXPOSURE WITH THE REPORTED EXPOSURE FOR GROUP D WHICH DID WELL AND GROUP I WHICH DID POORLY. NOTE THAT GROUP D CONSISTENTLY OVER-REPORTED THE EXPOSURES BY ABOUT 30 %. HAD THEY HAD CALIBRATION SAMPLES AS WAS THE CASE AT CROSSROADS, THEY WOULD PRESUMABLY HAVE DONE BETTER AND REDUCED THE BIAS TOWARD OVER--REPORTING. NOTE ALSO THAT, CONTRARY TO THE GAO BELIEF THAT FILM BADGES WORK ONLY BETWEEN .05 REM AND 2 REM, THE RESULTS BOTH ABOVE AND BELOW THAT RANGE ARE REASONABLE. THE GROUP I RESULTS SHOW THAT IT IS CERTAINLY POSSIBLE TO DO A VERY POOR JOB. THE POINT IS, FILM DOSIMETRY CAN BE DONE WELL. THE ISSUE IS, WAS IT DONE WELL AT CROSSROADS? GAO ACKNOWLEDGES THE CORRECTNESS OF THE PROCEDURES IN EFFECT AT OPERATION CROSSROADS. THE INDIVIDUAL WHO WAS THERE SUPERVISING THE PROCEDURE SWEARS THAT THE PROCEDURES WERE COMPLIED WITH. (SEE ENCLOSURE 3.) PHOTOGRAPHS SHOW THAT THE CROSSROADS DOSIMETRY OPERATION WAS CONDUCTED USING STATE-OF-THE-ART EQUIPMENT AND HISTORICAL DOCUMENTS ESTABLISH THAT THE AIR CONDITIONING CAREFULLY CONTROLLED THE LABORATORY ENVIRONMENT. HENCE, THE "HARSH" CONDITIONS DID NOT IN FACT EXIST AND GAO HAS PROVIDED NOT ONE PIECE OF EVIDENCE TO THE CONTRARY. THE CONTROLLING FACT, WHICH IS DOCUMENTED IN DR. DESSAUER'S STATEMENT, IS THAT THE PRE-EXPOSED CONTROL FILMS FROM EACH BATCH WERE DEVELOPED RIGHT ALONG WITH THE FILM BADGES FROM

THAT BATCH. THUS, EVEN IF DEVELOPMENT PROCEDURES WERE NOT PROPERLY PERFORMED, AND ALL OF THE EVIDENCE INDICATES THAT SUCH WAS NOT THE CASE, THE DISCREPANCIES WOULD HAVE BEEN REFLECTED IN THE CONTROL SAMPLES. ANY ERRORS, THEREFORE, WOULD HAVE BEEN SELF-CORRECTING. ACCORDINGLY, DNA ADHERES TO ITS CONCLUSION THAT FILM BADGES WERE ACCURATE TO WITHIN 30%.

IN A CLOSELY RELATED QUESTION, GAO QUESTIONS DNA'S CONCLUSION THAT ENVIRONMENTAL DAMAGE TO THE FILM BADGES WOULD HAVE RESULTED IN OVER-REPORTING RATHER THAN UNDER-REPORTING RADIATION EXPOSURE. DNA AND GAO AGREE THAT A NUMBER OF FACTORS, INCLUDING EXPOSURE TO HEAT, LIGHT, AND HUMIDITY, WILL RESULT IN POTENTIAL OVER-REPORTING. WE ALSO AGREE THAT ONE FACTOR, HIGH HUMIDITY WITHOUT CONDENSATION, COULD RESULT IN UNDER-REPORTING. DNA'S CONCLUSION IS BASED UPON THE OPINIONS OF RECOGNIZED EXPERTS, THE NUMBER AND DEMONSTRATED EXISTENCE OF THE FACTORS KNOWN TO CAUSE OVER-REPORTING AT CROSSROADS, AND THE LIKELIHOOD THAT EXTREME HEAT AND HUMIDITY WOULD GIVE RISE TO CONDENSATION. GAO'S ARGUMENT IS BASED UPON THE FACT THAT A SAMPLE OF ENVIRONMENTALLY DAMAGED BADGES USED UNDER DIFFERENT CIRCUMSTANCES AT KWAJALEIN READ ZERO AND HENCE DID NOT REFLECT OVER-REPORTING. WHILE TRUE, THIS FACT PROVIDES NO BASIS FOR AN ASSUMPTION THAT ENVIRONMENTAL EFFECTS EXPERIENCED DURING CROSSROADS RESULTED IN UNDER-REPORTING. AT MOST, ASSUMING THAT THE DIFFERENT CIRCUMSTANCES OF USE DO NOT RENDER THAT DATA IRRELEVANT, THE KWAJALEIN DATA DEMONSTRATES THAT CROSSROADS FILM BADGE READINGS SHOULD NOT BE REDUCED TO ACCOUNT FOR ENVIRONMENTAL EFFECTS. DNA HAS REPORTED FILM BADGE READINGS WITHOUT ADJUSTMENT. WE HAVE NEVER ARGUED

THAT RECORDED READINGS SHOULD BE ARBITRARILY REDUCED.

ONE DISAGREEMENT REMAINS WITH RESPECT TO FILM BADGES. DNA AND GAO AGREE THAT THE FILM BADGES USED AT CROSSROADS WERE INTENDED TO MEASURE RADIATION IN THE "RANGE" FROM 0.05 REM TO 2.0 REM. AT THE LOW END, GAO ARGUES THAT ALL REPORTED ZERO DOSES SHOULD BE INCREASED TO 0.05 REM BECAUSE THAT WAS THE MINIMUM DETECTABLE LEVEL FOR THE BADGES. THIS ARGUMENT REFLECTS A PROFOUND MISUNDERSTANDING OF FILM BADGE OPERATION. THERE IS NO STEP FUNCTION BETWEEN ZERO AND THE LOWER "RANGE" OF A FILM BADGE. ALL EXPOSURE TO RADIATION RESULTS IN DARKENING OF THE FILM. THE LOWER END OF THE "RANGE" IS DESIGNATED BASED UPON THE FACT THAT READINGS BELOW THE LOWER END ARE NOT PARTICULARLY ACCURATE. THAT DOES NOT MEAN, HOWEVER, THAT ZERO CANNOT BE DISTINGUISHED FROM HIGHER THAN ZERO. IN THE CASE OF CROSSROADS, THE LEDGERS REFLECT THAT READINGS WERE MADE AND RECORDED AT LEVELS OF 0.01 REM. DR. DESSAUER HAS ADVISED IN THE ATTACHED STATEMENT THAT 0.01 REM COULD BE MEASURED. WE ARE NOT AWARE OF ANYONE IN THE NUCLEAR COMMUNITY, WHETHER IT BE WEAPONS, COMMERCIAL POWER, INDUSTRIAL, OR MEDICAL, WHO ACCEPTS THE GAO PROCEDURE, AND HAVE NOT FOUND A QUALIFIED SCIENTIST WHO AGREES WITH THEIR HYPOTHESIS. ACCORDINGLY, THERE IS NO BASIS FOR RAISING ALL RECORDED ZERO DOSES TO 0.05 REM. AT THE HIGH END OF THE SCALE WE DO NOT DISAGREE REGARDING THE ACTION WHICH SHOULD BE TAKEN, ALTHOUGH IT IS DIFFICULT TO DISCERN THAT FACT BY READING THE GAO REPORT. OF THE MORE THAN 42,000 CROSSROADS PARTICIPANTS, ONLY 9 HAD FILM BADGES WHICH REGISTERED OVER 2 REM.

ABOVE ABOUT 2 REM, FILM BADGE ACCURACY BEGINS TO DROP, HOWEVER

THE BADGES DO RECORD AND CAN BE READ WELL ABOVE 2 REM. ALL SUCH CASES SHOULD BE THOROUGHLY INVESTIGATED AND THE NINE CASES AT CROSSROADS HAVE BEEN THE SUBJECT OF A SERIES OF CAREFUL REVIEWS. WHEN THE BADGES WERE READ, THE CROSSROADS RADIATION SAFETY PERSONNEL INITIATED AN IMMEDIATE INVESTIGATION SINCE THE NINE MEN WERE NOT ENGAGED IN ACITIVITIES THAT SHOULD HAVE RESULTED IN ANY SIGNIFICANT EXPOSURE. IN THE INTERVENING YEARS THESE CASES HAVE BEEN REPEATEDLY RESTUDIED. ALL OF THE REVIEWS HAVE RESULTED IN THE CONCLUSION THAT THE READINGS DID NOT REFLECT THE TRUE EXPOSURE OF THE INDIVIDUALS CONCERNED AND THAT THE TRUE EXPOSURES WERE WELL BELOW 2 REM. IN ITS DOSE ASSIGNMENT, THE NTPR PROGRAM HAS CREDITED THESE MEN WITH 2 REM.

THE SECOND PRINCIPAL DISAGREEMENT INVOLVES THE PERSONAL DECONTAMINATION PROCEDURES EMPLOYED BY PERSONNEL WHO BOARDED CONTAMINATED TARGET VESSELS. GAO, CITING A STATEMENT IN THE DNA HISTORICAL REPORT THAT MORE THAN 17,000 PARTICIPANTS WERE ON SHIPS THAT ENTERED THE AREA OF THE TARGET ARRAY, SPECULATES THAT LARGE NUMBERS OF PERSONNEL MAY HAVE BEEN OVER-EXPOSED AS A RESULT OF "EVOLVING" RADIATION SAFETY REGULATIONS. THE GAO SPECULATION IS BASED UPON THEIR VIEW THAT RADIATION SAFETY REGULATIONS WERE NOT PROMULGATED (AND, HENCE, THAT RADIATION SAFETY PRACTICES WERE EITHER UNKNOWN OR DISREGARDED) UNTIL AFTER MOST OF THE EXTENSIVE DECONTAMINATION EFFORTS HAD BEEN COMPLETED. HAD GAO CONSIDERED ALL OF THE AVAILABLE EVIDENCE RATHER THAN FOCUSING UPON A FEW GENERALIZED STATEMENTS, THEY WOULD HAVE CONCLUDED, LIKE DNA, THAT DECONTAMINATION OF PERSONNEL WHO VISITED THE TARGET SHIPS IS NOT A SIGNIFICANT ISSUE WITH RESPECT TO DOSES ACTUALLY RECEIVED.

BETWEEN JULY 25, 1946, THE DATE OF THE DETONATION GIVING RISE TO THE CONTAMINATION, AND JULY 31, 1946, ONLY ABOUT 400 PERSONNEL BOARDED TARGET SHIPS. THESE PERSONNEL WERE SCIENTISTS RETRIEVING DATA FROM THEIR INSTRUMENTATION, DAMAGE INSPECTION TEAMS, AND ACCOMPANYING RADIATION SAFETY MONITORS. MOST OF THESE PERSONNEL HAD EXTENSIVE EXPERIENCE AS A RESULT OF THEIR PREVIOUS WORK ON THE MANHATTAN PROJECT AND ALL OF THEM WERE KNOWLEDGEABLE CONCERNING RADIATION SAFETY AND DECONTAMINATION PROCEDURES. THESE INITIAL BOARDING PARTIES DID NOT ENGAGE IN LARGE SCALE EFFORTS TO DECONTAMINATE THE SHIPS. ON JULY 31, 1946, RADIATION SAFETY REGULATIONS WERE PROMULGATED FOR ALL TARGET VESSELS AND THEIR CREWS (ENCLOSURE 5). GAO DOES NOT CONTEST THE FACT THAT IF THE DECONTAMINATION PROCEDURES DESCRIBED IN THE ENCLOSURES WERE FOLLOWED, THE POTENTIAL FOR SIGNIFICANT ADDITIONAL INDIVIDUAL EXPOSURE DUE TO RETENTION OF EXTERNAL CONTAMINATION ON THE BODY OR CLOTHES IS REMOTE. DR. CONARD, A CROSSROADS VETERAN, PHYSICIAN, AND RADIOBIOLOGIST WILL TESTIFY THAT THE PROCEDURES WERE FOLLOWED. THEREFORE, THERE IS NO SCIENTIFIC BASIS FOR INCREASING RADIATION EXPOSURE ESTIMATES BASED UPON "EVOLVING RADIATION SAFETY PRACTICES". IF, IN THE FUTURE, WE DISCOVER ANY CREDIBLE EVIDENCE THAT PERSONNEL LEAVING THE TARGET VESSELS WERE NOT PROPERLY DECONTAMINATED, WE WILL RECALCULATE THE ESTIMATED DOSES FOR THE AFFECTED INDIVIDUALS USING THE NEW INFORMATION. AT PRESENT, HOWEVER, THERE IS NO REASON TO ASSUME THAT THE APPROXIMATELY 9,000 PEOPLE (21% OF THE CROSSROADS PARTICIPANTS) WHO ACTUALLY BOARDED THE TARGET VESSELS RECEIVED ANY ADDITIONAL EXPOSURE AS A RESULT OF INADEQUATE PERSONAL DECONTAMINATION.

THE THIRD MAJOR AREA OF DISAGREEMENT INVOLVES INTERNAL EXPOSURE. DNA AND GAO AGREE THAT THERE ARE THREE POSSIBLE ROUTES BY WHICH CONTAMINATION CAN BE DEPOSITED WITHIN THE BODY: INHALATION, INGESTION, AND THROUGH WOUNDS. WE DISAGREE, HOWEVER, REGARDING THE SIGNIFICANCE OF EACH OF THESE ROUTES AT OPERATION CROSSROADS. WITH RESPECT TO INHALATION, DNA CALCULATED THE POTENTIAL INTERNAL EXPOSURE BY ASSUMING THAT THERE WAS, DURING THE TIMES OF INTEREST, A CONSTANT RATIO BETWEEN THE ALPHA, BETA, AND GAMMA RADIATION. THIS ASSUMPTION WAS BASED UPON CLASSIFIED DATA DERIVED FROM RADIOCHEMICAL ANALYSIS OF DEBRIS IN THE CLOUD SHORTLY AFTER THE DETONATION AND UNCLASSIFIED DATA DERIVED FROM RADIOCHEMICAL ANALYSIS OF SAMPLES TAKEN FROM THE CONTAMINATED SHIPS ON SEPTEMBER 6, 1946. THIS DATA, WHICH DISCLOSED THE RATIOS BOTH IMMEDIATELY BEFORE AND IMMEDIATELY AFTER THE EFFORTS TO DECONTAMINATE THE TARGET SHIPS, CORRELATED REMARKABLY WELL AND REFLECTED THE FACT THAT, AT EARLY TIMES, THERE WAS A CONSTANT RATIO BETWEEN THE VARIOUS TYPES OF RADIATION. GAO, ON THE OTHER HAND, RELIED ON DATA TAKEN SEVERAL MONTHS AFTER OPERATION CROSSROADS, AFTER EXTENSIVE DECONTAMINATION EFFORTS, AND AFTER THE SHIP INVOLVED HAD SAILED FROM BIKINI TO SAN FRANCISCO. IN VIEW OF THE MANY VARIABLES BETWEEN OPERATION CROSSROADS AND THE COLLECTION OF THE DATA RELIED UPON BY GAO, OUR SCIENTISTS CONCLUDED THAT THE EARLIER DATA WAS MORE RELIABLE. IN FACT, ONE WOULD EXPECT THE RATIO TO BE DIFFERENT SEVERAL MONTHS AFTER THE DETONATION AND AFTER THE TIME AT WHICH THE POTENTIAL FOR EXPOSURE EXISTED. MOREOVER, THE METHODOLOGY EMPLOYED BY DNA ASSURED THAT CHANGES IN THE RATIO OVER TIME COULD NOT RESULT IN AN UNDERESTI-

MATION OF DOSE. OUR SCIENTISTS, USING THE CONSTANT RATIO DERIVED FROM THE CONTEMPORANEOUS DATA, CALCULATED THE AMOUNT OF PLUTONIUM CONTAMINATION INITIALLY PRESENT ON THE TARGET SHIPS. THAT AMOUNT WAS THEN HELD CONSTANT THROUGHOUT THE REMAINDER OF THE OPERATION. ANY SUCCESSFUL DECONTAMINATION, WEATHERING, OR OTHER FACTORS WHICH INTERVENED DURING THE COURSE OF THE OPERATION COULD ONLY HAVE REDUCED RATHER THAN INCREASED THE AMOUNT OF PLUTONIUM AVAILABLE FOR RESUSPENSION. ACCORDINGLY, THE DNA METHODOLOGY TENDS TO OVER-STATE RATHER THAN UNDER-STATE THE POTENTIAL INTERNAL DOSE.

WITH RESPECT TO INGESTION, DNA PERFORMED WHAT WE BELIEVE TO BE A REASONABLE WORST CASE ANALYSIS AND DETERMINED THAT LITTLE RADIOACTIVE MATERIAL COULD HAVE BEEN INGESTED. GAO SPECULATED THAT OTHER CASES MIGHT HAVE, IN FACT, BEEN WORSE, AND SUGGESTED AT LEAST ONE SCENARIO WHICH THEY BELIEVED HAD GREATER POTENTIAL FOR INGESTED DOSE. HOWEVER, WHEN WE CALCULATED THE POTENTIAL EXPOSURE ASSOCIATED WITH THE SCENARIO PROVIDED BY GAO WE FOUND THAT IT RESULTED IN LOWER ESTIMATES THAN OUR WORST CASE. WE REMAIN CONVINCED THAT THE SCENARIO SELECTED BY DNA PRESENTED THE GREATEST REASONABLE POTENTIAL FOR INGESTION. HOWEVER, IF A CREDIBLE SCENARIO IS PRESENTED WHICH COULD RESULT IN A GREATER DOSE, WE WILL PERFORM THE NECESSARY CALCULATIONS. IF A HIGHER POTENTIAL DOSE RESULTS, WE WILL SUBSTITUTE THAT SCENARIO FOR OUR WORST CASE. IN THIS REGARD, IT SHOULD BE NOTED THAT WHEN WE RECEIVE A REQUEST FOR A DOSE ESTIMATE FROM THE VETERANS ADMINISTRATION, WE PERFORM AN INDIVIDUALIZED REVIEW. ACCORDINGLY, IF THERE IS INFORMATION WHICH INDICATES THAT THE VETERAN MAY HAVE

EATEN IN A CONTAMINATED AREA, WE CALCULATE A DOSE BASED UPON THE FACTS PRESENTED.

THE REMAINING ROUTE TO INTERNAL EXPOSURE IS POSSIBLE CONTAMINATION THROUGH AN OPEN WOUND. ALTHOUGH GAO COMPLAINS THAT THE HYPOTHETICAL WOUND WE USED IN OUR CALCULATIONS MAY NOT HAVE BEEN THE MOST SEVERE WOUND AN INDIVIDUAL COULD HAVE RECEIVED AND STILL NOT REQUIRED MEDICAL ATTENTION, THEY PROVIDE NO ALTERNATIVE WOUND. UNDER THESE CIRCUMSTANCES WE CAN ONLY REFER, ONCE AGAIN, TO THE COMMENTS DOD SUBMITTED IN RESPONSE TO THE DRAFT GAO REPORT WHICH ARE REPRINTED AT PAGES 86 AND 87 OF THE FINAL REPORT. IN THIS REGARD, IT SHOULD BE NOTED THAT WE HAVE SEARCHED THE MEDICAL RECORDS OF THE CROSSROADS PARTICIPANTS AND THERE IS ONLY ONE DOCUMENTED CASE OF A CONTAMINATED WOUND AT CROSSROADS. FURTHERMORE, IN THE EVENT A VETERAN REPORTS THAT HE RECEIVED SUCH A WOUND, WE WILL PERFORM THE NECESSARY CALCULATIONS. ACCORDINGLY, ARGUMENTS AS TO WHAT MAY OR WHAT MAY NOT HAVE BEEN THE WORST UNTREATED WOUND ARE NOT PARTICULARLY PRODUCTIVE.

THE FOURTH DISAGREEMENT BETWEEN DNA AND GAO PERTAINS TO THE POTENTIAL FOR EXTERNAL BETA RADIATION. GAO PLACES GREAT STRESS ON THE FACT THAT BETA RADIATION CAN PENETRATE TISSUE TO A DISTANCE OF ONE HALF INCH AND THEREBY POSE A THREAT TO THOSE ORGANS NEAR THE SURFACE OF THE SKIN (THE EYES AND THE MALE GONADS). WHILE THIS IS TRUE, IT IS NOT RELEVANT. TO HAVE THAT MUCH PENETRATING POWER THE BETA RAY ENERGY MUST BE OVER 2 MILLION ELECTRON VOLTS. THE BETA RADIATION ASSOCIATED WITH FISSION PRODUCTS AT ANY TIME LATER THAN AUGUST 1, 1946 HAS ONLY A VERY SMALL COMPONENT HAVING SUCH ENERGY LEVELS. LESS THAN 0.02% OF

THE BETA RADIATION IN THE ENVIRONMENT OF INTEREST HAS SUCH PENETRATING POWER. IN ORDER TO EXPOSE ANY ORGAN ONE HALF INCH DEEP TO AS MUCH AS ONE REM OF SUCH BETA RADIATION, THEREFORE, THE SURFACE OF THE SKIN WOULD HAVE TO BE EXPOSED TO THOUSANDS OF REM BETA. ANY EXTERNAL DOSE APPROACHING THAT LEVEL WOULD BE ASSOCIATED WITH EXTREME DAMAGE TO THE TISSUE OF THE SKIN, REQUIRING IMMEDIATE MEDICAL TREATMENT, AND, PROBABLY, A LETHAL OR NEAR LETHAL DOSE OF GAMMA RADIATION. WE KNOW FROM OUR REVIEW OF MEDICAL RECORDS, OUR REVIEW OF THE OFFICIAL TEST REPORTS. OUR INTERVIEWS WITH RESPONSIBLE OFFICIALS, THE RADIATION MEASUREMENTS RECORDED BY BOTH FILM BADGES AND RADIAC DEVICES, AND OUR DOSE RECONSTRUCTION CALCULATIONS THAT NO SERVICE MEMBERS WERE EXPOSED TO SUCH LEVELS OF RADIATION. MOREOVER, IT IS APPARENT FROM THE MEASURED GAMMA RADIATION AND THE DOCUMENTED RELATIONSHIPS BETWEEN GAMMA RADIATION AND BETA RADIATION IN FISSION PRODUCTS THAT ANY EXTERNAL BETA RADIATION WAS LOW. ACCORDINGLY, NO USEFUL PURPOSE WOULD BE SERVED BY CONDUCTING EXTENSIVE SEPARATE CALCULATIONS OF EXTERNAL BETA RADIATION AS SUGGESTED BY GAO.

WHILE NOT DIRECTLY RELATED TO THE DOSE ESTIMATES ASSIGNED TO THE SERVICE MEMBERS WHO PARTICIPATED IN OPERATION CROSSROADS, GAO ALSO SUGGESTED THAT DNA REQUIRE THE SERVICES TO REPORT THE ERROR MARGINS ASSOCIATED WITH FILM BADGE READINGS IN EACH RESPONSE TO THE VETERANS ADMINISTRATION. (DNA ALREADY REQUIRES THAT THE ERROR MARGINS, ASSOCIATED WITH RECONSTRUCTED DOSES, IF KNOWN, BE REPORTED.) DNA DOES NOT CONCUR WITH THIS RECOMMENDATION. WE HAVE FURNISHED OUR REPORT ON THE ACCURACY OF FILM BADGES AND OTHER DEVICES USED DURING THE ATMOSPHERIC NUCLEAR TESTING PROGRAM TO

EACH VETERANS ADMINISTRATION REGIONAL OFFICE AND WE DO REQUIRE THAT THE LETTERS FROM THE SERVICE NTPR TEAMS SPECIFICALLY REFER TO THIS DOCUMENT.

EARLIER IN THIS STATEMENT I NOTED THAT MOST OF THE AREAS IN WHICH DNA AND GAO DISAGREE CONCERN SCIENTIFIC ASPECTS OF THE DNA DOSE RECONSTRUCTION METHODOLOGY. HAVING BRIEFLY SUMMARIZED OUR AREAS OF DISAGREEMENT, I WOULD LIKE TO POINT OUT THE TECHNICAL NATURE OF THE ISSUES INVOLVED. ON FILM BADGES, WE DISAGREE REGARDING THE OVERALL ACCURACY AND THE MEANING OF THE LOWER "RANGE" OF THE BADGE. IT IS OUR VIEW THAT GAO RELIED UPON DATA WHICH A QUALIFIED SCIENTIST WOULD RECOGNIZE AS BEING OF ONLY MARGINAL RELEVANCE AND, IN VIEW OF THE HISTORICAL EVIDENCE AND TESTIMONY AVAILABLE, NOT WORTHY OF CONSIDERATION. WITH RESPECT TO DECONTAMINATION PROCEDURES, THE ISSUE IS LESS TECHNICAL. BASED ON THE RECORDS ATTACHED TO THIS STATEMENT AND OUR DISCUSSIONS WITH RESPONSIBLE OFFICIALS, DNA HAS CONCLUDED THAT OUR RECONSTRUCTION REASONABLY REFLECTS THE CONDITIONS THAT ACTUALLY PREVAILED. WITHOUT PRESENTING EVIDENCE TO THE CONTRARY, GAO REJECTS OUR CONCLUSION. ON INTERNAL DOSE, THE ONLY TRULY SUBSTANTIVE DISPUTE REVOLVES AROUND GOOD SCIENTIFIC JUDGMENT IN THE SELECTION OF DATA AND THE APPLICATION OF PRINCIPLES OF PHYSICS. THAT IS, WHAT METHODOLOGY AND ASSUMPTIONS BEST CALCULATE THE AMOUNT OF PLUTONIUM AVAILABLE FOR INHALATION ON THE TARGET SHIPS? FINALLY, WITH REGARD TO EXTERNAL BETA RADIATION, THE DISAGREEMENT RESULTS FROM GAO'S REFUSAL OR INABILITY TO RECOGNIZE THAT ONLY AN EXTREMELY MINUTE PROPORTION OF THE BETA RADIATION AFTER A NUCLEAR DETONATION HAS SUFFICIENT ENERGY TO

CONSTITUTE A HAZARD TO ANY ORGAN.

ALTHOUGH I HAVE DISCUSSED THE GAO REPORT AT SOME LENGTH, THE REAL REASON FOR THE NTPR PROGRAM AND THE ASSOCIATED RESEARCH IS THE CONCERN THAT VETERANS MIGHT HAVE BEEN PLACED AT INCREASED RISK OF DISEASE AS A RESULT OF THEIR PARTICIPATION IN THE ATMOSPHERIC NUCLEAR TESTS. THAT IS WHAT GAVE RISE TO THE DOD PROGRAM AND, I BELIEVE, THAT IS WHAT UNDERLIES THE CONTINUING INTEREST OF THE VETERANS, CONGRESS, THE MEDIA, AND THE PUBLIC. THE CENTERS FOR DISEASE CONTROL STUDY WHICH INITIATED THE NTPR PROGRAM HAS NOW BEEN COMPLETED AND THE RESULTS WERE PUBLISHED IN THE AUGUST 5, 1983 *JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION*. A COPY OF THE FINAL REPORT IS ATTACHED (ENCLOSURE 6). THE AUTHORS CONCLUDED THAT:

> "THE LEUKEMIA FINDINGS MAY BE ATTRIBUTABLE EITHER TO CHANCE, TO FACTORS OTHER THAN RADIATION, OR TO SOME COMBINATION OF RISK FACTORS, POSSIBLY INCLUDING RADIATION."

AT THE REQUEST OF DNA AND THE DEPARTMENT OF ENERGY, THE NATIONAL ACADEMY OF SCIENCES PERFORMED AN EXTENSIVE MORTALITY STUDY OF ATMOSPHERIC NUCLEAR TEST PARTICIPANTS. AFTER STUDYING MORE THAN 50,000 VETERANS (APPROXIMATELY ONE-QUARTER OF THE PARTICIPANTS) THE NATIONAL ACADEMY CONCLUDED THAT:

> "THE NUCLEAR TEST VETERANS HAD A LOWER OVERALL INCIDENCE OF DEATH, AND IN PARTICULAR, A LOWER INCIDENCE OF DEATH FROM RADIOGENIC DISEASES, THAN THE GENERAL PUBLIC." (SEE ENCLOSURE 7.)

IN CONCLUSION, I WOULD JUST LIKE TO STATE THAT THIS IS A VERY DIFFICULT PROBLEM. WE HAVE GREAT SYMPATHY FOR ANY VETERAN WHO IS SUFFERING FROM DISEASE OR DISABILITY. AT THE SAME TIME, HOWEVER, WE HAVE AN OBLIGATION TO ASSURE THAT THE DOSES ASSIGNED TO INDIVIDUALS REFLECT, AS ACCURATELY AS POSSIBLE, BOTH THE HISTORICAL FACTS AND THE BEST AVAILABLE SCIENTIFIC METHODOLOGY. AS WE PROCEED WITH THE NTPR PROGRAM, WE WILL CONTINUE TO SEEK OUT AND APPLY ANY SOUND SUGGESTIONS OR CRITICISM WHICH WE RECEIVE.

WE WILL BE HAPPY TO ANSWER ANY QUESTIONS YOU MAY HAVE.

(Missing enclosures retained in committee files.)

Fact Sheet

dna
Defense Nuclear Agency
Public Affairs Office
Washington, D.C. 20305

3 April 1984

Subject: Nuclear Test Personnel Review (NTPR)

Background of NTPR Program.

Between 1945 and 1962, the Atomic Energy Commission (AEC) carried out some 235 atmospheric nuclear tests, principally in Nevada and the Pacific Ocean. An estimated 203,000 Department of Defense (DoD) personnel, military and civilian, were involved in this testing and many received low-level ionizing radiation exposures in the performance of various activities. Almost all the exposures were well within internationally accepted radiation exposure limits.

In 1977, the Centers for Disease Control (CDC), as a result of its investigation of a leukemia case involving an individual who had participated in Shot SMOKY at the Nevada Test Site in 1957, became interested in the health status of all personnel who had been present at that shot. By late 1977, a DoD ad hoc committee, working together with CDC, had reconstructed a list of approximately 3,200 DoD personnel who were at or near the Nevada Test Site on the day of the SMOKY test and determined that some eight leukemia cases had occurred among them. CDC calculations indicated the expected incidence of leukemia would be three to four cases. CDC undertook an epidemiological study of these personnel and subsequently identified an additional leukemia case. However, after continued study, the CDC has recently (1983) attributed the larger than expected number of SMOKY leukemia cases to chance, factors other than radiation, or some combination of risk factors possibly including radiation. In addition, no increased mortality from other forms of cancer has been observed in this group and the total number of deaths from all causes is essentially what would be normally expected.

Responding to this initial indication of a possible health problem, DoD, in December 1977, began a program of wide-ranging actions on behalf of the atmospheric nuclear test participants. The Defense Nuclear Agency (DNA) was appointed DoD's Executive Agent for this effort. The Nuclear Test Personnel Review (NTPR) program was established by DNA to carry out these responsibilities.

Scope of NTPR Program.

The Nuclear Test Personnel Review Program specific tasks are to:

- Compile a roster of the DoD personnel involved in the atmospheric nuclear tests.
- Develop a history of each atmospheric nuclear event that involved DoD personnel.
- Declassify all possible nuclear test related source documents which formerly bore a security classification.
- Provide estimates of atmospheric test radiation doses -- both as a check on film badge readings and as a substitute for them in those cases where badges were not worn or readings were not recorded or are not retrievable.
- Establish personal contact with as many test participants as possible.
- Identify those individuals who received a higher radiation dose than those doses recommended under current Federal guidelines for radiation workers, notify those individuals

of their dose and offer them free medical examinations at Government hospitals.

- Sponsor, in conjunction with the Department of Energy (DOE), an independent mortality study by the National Academy of Sciences (NAS) of test participants selected by the NAS.

- Carry out a detailed research program, in conjunction with the on-going NTPR Program, to recover all data pertaining to possible radiation exposure of U.S postwar occupation troops at Hiroshima and Nagasaki, Japan. (This item was added to the original NTPR tasks in 1979 when concerns arose among veterans of the postwar occupation of those cities that they might be experiencing adverse health effects. Thus, since the Autumn of 1979, DNA has carried out a detailed research program to recover from records, historical documents, and interviews all possible data pertaining to the possible radiation exposure of those occupation troops.)

- Provide assistance to the veteran, the Veterans Administration (VA), and other organizations by doing individual research and by providing as complete data as possible on individual participation and radiation doses.

The overall NTPR effort is directed by the Defense Nuclear Agency, Washington, D.C. An NTPR team in each military service conducts detailed research into that service's participation in the atmospheric nuclear test program. A separate team at DNA's Field Command in Albuquerque, New Mexico has responsibility for research of records concerning DoD civilian employees and directs research into test participation by the former Armed Forces Special Weapons Project, a key test entity. In addition, DNA employs several contractors to provide specialized supporting services. The program has now been underway for five years, and about two more years will be required to complete the research. All phases of the NTPR program are being pursued on a high-priority basis, with adequate manpower (averaging about 150 man-years per year) and funding (over $6 million per year). Its completion time is governed by the fact that necessary data are spread among large numbers of repositories and contained in hundreds of thousands of documents.

NTPR Program Accomplishments

- First, the NTPR program has conducted most of the extensive research necessary to retrieve every possible bit of data about personnel participation and radiation exposure from records, archives, repositories, files, and other sources throughout the U.S. in order to piece together a coherent, personnel-oriented history of the atmospheric test program. The historical volumes (organized by series and shot, showing which organizations were there, what these organizations were doing, what radiological safety precautions were taken, what radiation dose levels were present, and other information) are being distributed to over 700 locations (including many public libraries and all VA regional centers) throughout the U.S and overseas locations. The status of publication of these historical reports is:

CONUS Operations	Date	Oceanic Operations	Date
TRINITY (1945)	Dec 83	CROSSROADS (1946)	Jun 84 (Est)
RANGER (1951)	Feb 82	SANDSTONE (1948)	Jan 84
BUSTER-JANGLE (1951)	Jun 82	GREENHOUSE (1951)	Nov 83
TUMBLER-SNAPPER (1952)	Jun 82	IVY (1952)	Dec 82
UPSHOT-KNOTHOLE (1953)	Jan 82	CASTLE (1954)	Apr 82
TEAPOT (1955)	Nov 81	WIGWAM (1955)	Sep 81
PLUMBBOB (1957)	Sep 81	REDWING (1956)	Sep 83
HARDTACK II (1958)	Oct 83	HARDTACK I (1958)	Nov 83
DOMINIC II (1962)	Jan 83	ARGUS (1958)	Apr 82
PLOWSHARE (1962)	Mar 83	DOMINIC I (1962)	Nov 83

Participants who have written or called will be notified when volumes of concern to them have been published and informed of the location of repositories to which distribution has been made. This research/historical report production effort will continue until all atmospheric nuclear weapons tests have been documented and the historical volumes have been distributed.

Of the estimated 203,000 DoD participants in the tests, nearly 96 percent have been identified by name, and preliminary dose information has been recovered for about 143,000. The military services are reconstructing rosters from morning reports and ships' logs, searching medical records and other radiation dosimetry repositories, and identifying units' activities and movements. A product of this research will be listings of participants and their radiation dosimetry information for each series and shot; however, general release of these lists will not be made in order to protect personal data of individual participants.

Second, some 850 formerly classified documents containing information pertinent to the personnel aspects of atmospheric nuclear tests have been declassified. More than 750 of these documents have been catalogued for easy reference by former participants, the VA, and others and placed at the National Technical Information Service (NTIS) for ready public availability. NTIS is an agency of the Department of Commerce and offers these unclassified Department of Defense publications for sale along with other documents. The address and telephone number is: National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161, telephone 703-487-4650. If assistance is desired concerning the acquisition of material, most large public libraries are aware of NTIS and can assist in obtaining documents. The NTIS sales desk telephone number can also be called by any individual. If the exact report desired is not known, an NTIS subject analyst may be able to provide assistance. Moreover, most of the unclassified documents have been placed at the Department of Energy Nevada Operations Office Coordination and Information Center, Las Vegas, Nevada.

Third, the NTPR dose reconstruction program has proven to be of great value. It has been used to check the validity of film badge readings (with excellent correlation), to calculate doses for participating groups, and to reconstruct individual doses in specific cases (for instance, in support of veterans claims). As part of this effort, a separate analysis of possible internal dose due to inhalation and ingestion of radioactive materials is being done. (A later section of this fact sheet discusses dose levels to which participants in the atmospheric nuclear test program were exposed).

The National Academy of Sciences is reviewing the procedures developed for dose reconstruction, dose assignment, and determination of internal dose.

Fourth, the NTPR program operates a toll-free telephone line (800-336-3068)* for test participants to report their involvement in the tests. Information provided by participants has significantly aided in the research and development of a permanent, computerized data base and development of the test histories and dose reconstructions. To date, about 49,000 test participants have called or written DNA.

Fifth, the individual notification and medical examination program for all individuals who received doses higher than 5 rem** is being carried out in segments, as described below:

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* In Virginia, Hawaii, and Alaska call collect to (202) 274-9161.

** A rem is a unit of radiation dose equivalent and reflects the radiation energy deposited within the body tissue and its capability for causing an effect.

- In March 1979 a notification and medical examination program was initiated for all DoD test participants with cumulative doses from atmospheric testing in excess of 25 rem. The threshold of 25 rem was selected because it is the current recommended national guideline for one-time, planned exposures under emergency conditions. The National Council on Radiation Protection and Measurements evaluates the 25-rem threshold in the following terms in their NCRP Report No. 39 (p. 102):

> Since planned whole-body doses up to 25 rem are reasonably accepted for emergency conditions ..., it follows that accidental doses up to the same magnitude should not cause major concern. At higher levels and especially where the whole-body dose reaches 100 rem, medical observation and subsequent actions based primarily on medical opinion are the important aspects.

The NTPR program has identified a total of 39 DoD personnel in the over-25-rem group, with external doses ranging from just over 25 rem to an estimated high of 98 rem. Most of these were exposed as a result of a wind shift at Shot BRAVO during Operation CASTLE at Bikini in 1954. Four of the 39 are known to be dead from causes not associated with radiation (i.e., trauma, heart attacks). Of the remaining 35 who were all notified, 19 desired physicals, 7 did not want examinations, and 9 have not responded. Of the 13 examinations which have been scheduled, we currently have received the results of eleven. No adverse health effects associated with radiation exposure received at the atmospheric nuclear tests were found during these examinations. However, one of the 13 men has since been diagnosed as suffering from leukemia.

- In May 1979, the notification and medical examination program was expanded to include the DESERT ROCK Volunteer Observers (Officer Volunteers). These 44 volunteers received gamma doses ranging from a few millirem to about 17 rem; however, they were closer to ground zero than any other participants at the time of detonation. The officer volunteers at shots NANCY, SIMON, BADGER, and APPLE II were also exposed to neutron radiation.

- In June 1979, after careful evaluation to ensure the over-25-rem program was functioning well, the notification and medical examination program was expanded to include all participants identified with annual doses in excess of 5 rem. This threshold was chosen both because 5 rem is the current Federal guideline for allowable annual dose to radiation workers and because it is the best single standard to represent permissible dose levels for most DoD personnel at the time of the tests. Notification of participants is based not only on film badge records but also on dose calculations or dose estimates, if these show a possible over-5-rem dose. It is estimated that about 1,200 DoD personnel will be involved. To date, 65% of over-5-rem personnel have been contacted. Of this group, approximately one-quarter have taken physical exams from the Veterans Administration. The results of these physicals report that the incidence of cancer for this group is less than the national average.

- The VA offers free medical treatment to all test participants and Hiroshima/Nagasaki occupation forces. VA Circular 10-83-61 of April 1983 authorizes treatment for any ailment except those which are clearly not radiogenic in origin (e.g. appendicitis, tramatic injury, etc). In June 1983, DNA mailed VA Circular 10-83-61 to all participants for whom it had a current address.

- Throughout the course of the NTPR effort, the VA has had a program in effect whereby any eligible veteran test participant is given a free medical examination upon request.

Sixth, the National Academy of Sciences is well into its fourth year of work to ascertain whether atmospheric test participants exhibit any adverse health effects which might be attributable to test participation. It is conducting a scientific follow-up study of over 50,000 DoD participants in Operations GREENHOUSE (1951), UPSHOT-KNOTHOLE (1953), CASTLE (1954), REDWING (1956) and PLUMBBOB (1957).

Seventh, the Defense Nuclear Agency has completed research on the U.S. occupation of Hiroshima and Nagasaki. A detailed fact sheet on this has been produced and is being provided to all occupation personnel who have called or written to DNA. A detailed dose reconstruction--using assumptions chosen to give an estimate of the maximum possible dose --has also been completed. No areas of concern or significant doubt were identified, and the firm, well-substantiated conclusion is that the radiation doses received by members of the Hiroshima and Nagasaki occupation forces were negligible. DNA's research has disclosed no basis for concern by veterans of the Hiroshima and Nagasaki occupation forces over an increased risk of adverse health effects due to radiation during the occupation. In May 1981, the National Academy of Sciences convened a panel to review the occupation of Hiroshima and Nagasaki and to determine the feasibility and desirability of performing epidemiological studies of veterans who served in the occupation forces in Hiroshima or Nagasaki, Japan, immediately following the wartime bombing of those cities. The National Academy of Sciences panel concluded that:

(1) It would be impractical to conduct a scientifically sound morbidity (incidence of disease) study of Hiroshima and Nagasaki occupation forces.

(2) A mortality (cause of death) study would be possible, but was judged too costly compared to the scientific benefits.

(3) Based on the known health effects of radiation, the radiological exposures were too low to produce any detectable increase in death or illness.

(4) Even if an excess number of cases of multiple myeloma were present in this population of veterans, it is doubtful that ionizing radiation was the cause.

Finally, the Service NTPR teams have collected extensive basic information about each series and shot of the atmospheric test program in which that military service had any identified participants. They have also organized and trained their research teams in accessing individual service and medical records. They provide effective claims assistance to individual veterans and to the VA. The VA notifies DNA of all test participant veterans' claims and requests assistance in documenting participation and determining radiation dose, if any. The Service NTPR teams research all claims for the VA which have involvement in the atmospheric nuclear tests as the basis.

Dose Levels in the Atmospheric Test Program

Research to date indicates that most recorded doses to DoD personnel during the tests were quite low--averaging about half a rem. Of course, many participants received no dose at all, and only a very small percentage exceeded 5 rem per year, the current Federal guideline for allowable annual dose to radiation workers. The most basic source of dose data is the file maintained by the Reynolds Electrical and Engineering Company (REECo), a contractor of DoE (AEC), which is the official master repository of dose records for the atmospheric nuclear weapons tests. These REECo files, which contain the records of both DoD and AEC personnel, show the following:

REECo Film Badge Entries
(1945-1962)

Dose	Number of Entries	Percent of Entries
0	96,942	42%
0-1	108,010	46%
1.3	20,813	9%
3-5	5,219	2%
Over 5	1,319	Less than 1%
	232,303	

NTPR Cross-checks on Exposure Levels

To cross-check the accuracy and completeness of the dose data held by REECo, and to ensure that it is representative of DoD participants, the NTPR program conducted numerous separate research efforts on exposures. Examples are:

- Research into historical documentation of numerous individual shots and test series shows dose results similar to the REECo averages. For example: In DESERT ROCK I (Nevada, 1951), none of the participants received over 5 rem; in BUSTER-JANGLE (Nevada, 1951), 0.2 percent received over 5 rem; in TUMBLER-SNAPPER (Nevada, 1952), 1.2 percent received over 4 rem; in TEAPOT (Nevada, 1955), 0.5 percent received over 3.9 rem.

- The Navy NTPR team extracted from REECo files the dose records of former Navy personnel who participated in oceanic testing. Of these individuals, 37 percent received zero exposure and less than one percent received more than 5 rem. In a separate research effort, the Navy conducted a reliability check of radiation dose records obtained from 7,900 individual medical records. Tabulation of the dose showed that less than one percent received more than 5 rem.

- Dose reconstruction was accomplished on Shot SMOKY to check on the accuracy of film badge readings (i.e., to see if test participants might have received larger radiation doses than their film badges recorded). Good correlation between actual film badge readings (0.575 rem average) and the calculated dosage (0.480 ± 0.135 rem) gives considerable confidence in film badge accuracy.

- Dose reconstructions have been done on other shots and series, and all support the data contained in the REECo files.

- Spot checks were made of film badge readings for members of units which maneuvered in proximity to each other and thus should have received comparable exposures. The results were indeed comparable.

- Intensive research and analyses have been carried out regarding possible neutron exposures, since neutrons would not be recorded on film badges. Dose reconstructions indicate that individuals with significant neutron exposure were officer volunteers. All cases where there was a potential for significant neutron exposure have been investigated in detail.

Based on cross-checks such as these, one can be confident that radiation dose levels shown by the REECo master file data (i.e., an average dose of about half a rem for all participants, and less than one percent with doses above the current allowable annual Federal standard) are reasonably representative of all DoD personnel. The identification and quantification of possible exposure due to inhalation and/or ingestion of radioactive materials has been accomplished for a number of events. Thus far, there have been very few incidents of significant exposure. This study of inhalation and/or ingestion of radioactive materials will eventually encompass all of the atmospheric tests.

Health Effects of Ionizing Radiation

Numerous authorities, national and international, have addressed in detail the health risks caused by radiation doses and have recommended standards of acceptable doses for radiation workers. It has been established that adverse health effects can result from exposure to high levels of ionizing radiation (e.g., 100 rem or more). However, it is not known whether or not there are deleterious health effects from exposure to low levels of ionizing radiation (i.e., a few rem). These low level doses are comparable to life time background rates. For many years, medical scientists assumed there were no adverse effects from low exposure, i.e., that a "threshold" level of ionizing radiation existed, below which no adverse health effects would be caused. In the 1940's and 1950's, medical scientists gradually shifted to the present hypothesis--that there is no safe threshold, that even low levels carry some slight statistical risk, and that the degree of risk increases linearly with dose. This conclusion, however, is a hypothesis and is based on observations following high levels of exposure. No firm evidence exists to show that exposure to low levels of ionizing radiation would cause adverse health effects. Following are some examples of pertinent statements by medical and scientific authorities:

- The most direct data for the specific issue of atmospheric test participants comes from the Interagency Task Force on the Health Effects of Ionizing Radiation, conducted at White House direction and submitted to the President in August 1979 by the Secretary of Health, Education and Welfare. Its report states:

> For example, in a population of 10,000, one may normally expect 1,600 cases of fatal cancer; exposure of each of the 10,000 persons to one rem of low LET*, low rate, external, whole body radiation may be expected, under current risk estimates, to increase those deaths to roughly 1,601 (June 1979, p. 35).
>
> Thus, at current risk estimates, each individual has an overall likelihood of dying from cancer of about 16 percent, but the risk of dying from radiation-induced cancer is only about .01 percent for each rem of low-level exposure. Stated another way, 1,600 out of 10,000 persons will eventually die of cancer from various causes, but only one out of 10,000 may be expected to die of radiation-induced cancer following radiation exposure of one rem (June 1979, p. 5).
>
> Estimates vary, but the DoD, which is conducting a major research project to identify this test population, believes that about 250,000** DoD personnel (the great majority of them military) participated in these tests. While the actual exposure levels are under study, the current collective dose estimate is 115,000 person-rems at the Nevada and Pacific test sites. The currently assumed dose-response relationship for cancer would indicate about 12 excess cancer deaths from this estimated radiation dose over the lifetimes of the 250,000 involved (June 1979, p. 63).

- The International Commission on Radiological Protection (ICRP), the most prestigious international group addressing radiation issues, makes the same risk estimate in their 1977 - Recommendations of the International Commission on Radiological Protection, ICRP Publication 26, which states:

> For the purposes of radiation protection involving individuals, the Commission concludes that the mortality risk factor for radiation-induced cancers is about 10^{-2} Sv^{-1}, as an average for both sexes and all ages (January 17, 1977, p. 12). (Note: a sievert (Sv) equals 100 rem, thus the above statement puts the risk at one cancer death per 10,000 persons exposed to one rem.)

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*Linear Energy Transfer (LET) is the conventional expression for the rate of energy deposition measured along the track of an ionizing particle. Gamma rays and X-rays generate low-LET electron tracks. Alpha particles and neutrons generate high-LET tracks.

**Current estimate is about 203,000. The original figure included personnel who were involved in logistics, planning, or laboratory research, and were not actually at the tests. Also, personnel who attended several test series are now counted only once in the total estimate.

ICRP Report No. 26 also states, with regard to these risk estimates, that:

> The use of linear extrapolations, from the frequency of effects observed at high doses, may suffice to assess an upper limit of risk.... However, the more cautious such an assumption of linearity is, the more important it becomes to recognize that it may lead to an over estimate of the radiation risks.... Thus, in the choice of alternative practices, radiation risk estimates should be used only with great caution and with explicit recognition of the possibility that the actual risk at low doses may be lower than that implied by a deliberately cautious assumption of proportionality (p. 7).

The United Nations Scientific Committee on the Effects of Atomic Radiation, in their 1977 UNSCEAR report, states:

> The average risk of inducing a fatal malignancy is thus taken as being in the region of 10^{-4} rad^{-1} ... (p. 6) (that is, one fatal cancer for every 10,000 individuals exposed to one rad).

This UNSCEAR report also states:

> It must be emphasized again, however, that such a value is derived essentially from mortalities induced at doses in excess of 100 rad. The value appropriate to the much lower dose levels involved in occupational exposure, and even more so in environmental exposures to radiation, may well be substantially less (p. 414).

In 1980, the Committee on the Biological Effects of Ionizing Radiation (BEIR Committee) of the National Academy of Sciences issued The Effects on Populations of Exposure to Low Levels of Ionizing Radiation which updates their 1972 report. To illustrate risk calculations, the Committee considered two situations: a single exposure to 10 rads and a continuous, lifetime exposure of 1 rad per year. They found that the lifetime risk of cancer mortality ranges from 77 to 226 excess deaths per million per rad for the single exposure, and 67 to 182 excess deaths per million per rad for the continuous exposure. Thus for a single exposure to 10 rads, 770 to 2,260 excess cancer deaths are predicted per million people. The normal expectation of cancer deaths is from 160,000 to 170,000 per million. (pp. 191-192, 265) The 1980 BEIR report predicts a lower risk than their 1972 report. This is because they felt the linear response model used by the 1972 Committee to extrapolate from high exposure levels to low levels did not fit the epidemiological data from high dose exposures as well as the linear-quadratic dose-response model.

The National Council on Radiation Protection and Measurements, taking cognizance of all available information on health risks, stated in their 1971 NCRP Report No. 39, Basic Radiation Protection Criteria:

> The maximum permissible prospective dose equivalent for whole body irradiation from all occupational sources shall be 5 rem in any one year (p. 89).

NCRP Report No. 39 also states:

> In the interest of estimating effects in humans conservatively, it is not unreasonable to follow the assumption of a linear relationship between dose and effect in the low dose regions for which direct observational data are not available. It is generally agreed that such an assumption is conservative and would tend to give upper limits for any particular effect (p. 55).
>
> Experience with occupational exposure in the general neighborhood of presently acceptable limits over the last two or three decades has shown no identifiable injury ascribable to radiation (p. 50).

The NCRP reaffirms this 5 rem per year standard in their more recent (1975) Report No. 43. This report also states:

> The NCRP continues to hold the view that risk estimates for radiogenic cancers at low doses and low dose rates derived on the basis of linear (proportional) extrapolation from the rising portions of the dose-incidence curves at high doses and high dose rates, as described and discussed in subsequent sections of this report, cannot be expected to provide realistic estimates of the actual risks from low level, low LET radiations, and have such a high probability of over estimating the actual risk as to be of only marginal value, if any, for purposes of realistic risk-benefit evaluation (p. 2).

- The actual U.S. Federal radiation exposure standards were established by the President in 1960, based upon recommendations by the Federal Radiation Council. These standards are somewhat less stringent than the NCRP recommendations, in that they allow 3 rem per quarter, or 12 rem per year, until an accumulated dose equal to 5(N-18) is reached (where N is age in years). For example, a 26-year-old could, within today's Federal standards, receive doses of 12 rem per year for five years, thus accumulating 60 rem at the age of 30. Once the 5(N-18) limit is reached, allowable exposure is limited to 5 rem per year. The actual practice followed today however is to limit annual exposures to 5 rem.

- Nor is 5 rem per year a U.S. only limit. The ICRP, an international body, also recommends an allowable exposure of 5 rem per year for occupational workers, and even condones 12 rem per year under infrequent conditions.

MEDICAL FOLLOW-UP STUDIES OF PARTICIPANTS

- As a result of May 1981 panel convened by the National Academy of Sciences (NAS) to review the occupation of Hiroshima and Nagasaki, DNA asked NAS to investigate the incidence of multiple myeloma among the occupation forces. DNA and veterans groups supplied the Academy with the names of all known participants who reportedly had multiple myeloma. NAS confirmed the veterans diagnosis and participation. In June 1983, the Academy's report concluded that "the reported incidence of nine verified cases of multiple myeloma among U.S. veterans of the occupation forces stationed in or near Hiroshima and Nagasaki constitute an incidence no greater than that in the general U.S. population." Normally, the expected incidence in this population would be 18. After announcing its report, NAS identified and investigated four new cases. However, these new cases have not changed the basic conclusion of the NAS report.

- Recently, the Centers for Disease Control (CDC) updated the results of their study of SMOKY participants. It was the initial findings of the CDC which prompted the NTPR effort. The results of the CDC study were published in the Journal of American Medical Association (5 August 1983). The conclusions were that participant deaths due to cancer as well as total numbers of cases of cancer were slightly less than the statistical norm. The only abnormal finding was the larger number than expected of leukemia cases. This was attributed "to chance, factors other than radiation, or some combination of risk factors possibly including radiation."

- Preliminary National Academy of Sciences data from the first test series analyzed (PLUMBBOB) indicate that, as previously reported by the Centers for Disease Control, leukemia occurred excessively among participants at the particular Shot SMOKY. However, there is no excess of mortality from leukemia or from any other form of cancer among the 12,000 participants who witnessed the 23 other PLUMBBOB tests.

Summary

Based upon research to date, the average exposure of DoD participants in the atmospheric nuclear tests has been determined to be about one-tenth of the level that is generally agreed as an acceptable annual exposure for radiation workers; authorities widely agree in their assumption that the health risk from an exposure of half a rem is very low (approximately one fatal cancer per 20,000 individuals).

It should be noted that even today, 20-35 years after some DoD personnel participated in the atmospheric test program, the only scientific indication that there may be an increased health risk associated with test participation is CDC's identification of leukemia cases (now listed by CDC as ten) among participants whom CDC stated were present at the Nevada Test Site for Shot SMOKY, where the expected normal incidence in this group would be between three and four. (And, as stated earlier, CDC did not attribute this leukemia to be solely the result of exposure to ionizing radiation.)

The NTPR program is conducting a careful look into the history of the radiological safety aspects of the atmospheric nuclear weapons testing program, the development of historical documents to record the radiological exposures, and the identification of DoD personnel participation. These documents are now available to the public at various libraries throughout the United States or through NTIS.

So far, the careful and extensive study into the atmospheric nuclear test program indicates that overall the radiological safety precautions and safety measures taken, even in light of today's scientific knowledge of radiation effects, were adequate and there was only a very slight, if any, health risk to test participants.

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* *****************************************************************
*     This Fact Sheet Updates Nuclear Test Personnel Review (NTPR)  *
*     Fact Sheet, 10 January 1983                                   *
* *****************************************************************
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AFFIDAVIT

I, Gerhard Dessauer, being first duly cautioned and sworn, state that, during Operation CROSSROADS, I was Chief of the Photographic Dosimetry (Photometry for short), Section. I further state that:

At Operation CROSSROADS film badges provided a permanent record of the radiation doses received by personnel entering the lagoon after Test Able, and again after Test Baker.

These teams, approaching or boarding target ships, were preceded by "monitors", technicians with portable instruments who measured the prevailing radiation intensity before letting the teams proceed with their tasks, evaluating bomb damage, collecting biological specimens, taking photographs, etc.

To avoid approaching the then accepted limit of 5 roentgen per year and to permit each evaluator to participate in several such missions, an exposure goal of 100 milli r (.1 rem) per day was set. If the monitors decided that the proposed operation would require the party to remain so long that any of them might exceed 100 milli r, the operation was cancelled, or postponed to a later day, when the radioactive fission products and neutron induced activities would have sufficiently decayed.

It was expected that with these precautions most personal exposures would be well below 100 milli r per day and only a few higher. The film badges confirmed this. The few people whose badges indicated exposures larger than 100 milli r were excluded from visiting the lagoon for as many days as their excess exposure was a multiple of 100 milli r, or longer.

"Accuracy " of dose determined by instruments of films depends on careful calibration. All devices at Bikini had been calibrated with radium sources or high energy x ray machines producing photons in the energy range of the expected Bikini gamma rays. Relationships between the blackened photographic emulsion or readings of ionization chambers or Geiger counters on the one hand, and of the effect on human tissue on the other hand, depend on calculations and on assumptions about biological reactions. Both are subject to judgment and error. This makes the concept of an "accurate" dose somewhat illusory. It is better to discuss the reproducibility of a method: How consistent are the results when several samples from the same emulsion batch are exposed to the same amount of radiation?

Extensive calibrations of each production batch of film were carried out by Eastman Kodak and the University of Rochester Radiology Department before and during CROSSROADS. Film strips with ladders on which each step had received a different dose were prepared and used at Bikini, to calibrate the "densitometer" instruments. These are instruments in which a narrow pencil of light shines through the film. What fraction of this light is not absorbed by the black silver grains in the emulsion strikes a photocell. A meter on the instrument indicates what fraction of the incident light was absorbed by the film.

The so called "photographic density" is the power of 10 by which the intensity is reduced (to one tenth at density one, to one 100th at density two, etc.).

The reproducibility of readings for films exposed to the same dose was better than 10 milli r. Hence, in the range of interest (around 100 milli r) the reproducibility was better than 10 percent. At insignificant doses such as 20 milli r, it would be 50 percent. At doses of 200 milli r, it would be 5 percent. The degree of consistency of results when stated in terms of percent has been misleading. Lack of reproducibility should be quoted in terms of the corresponding uncertainty of dose. In our case it is 10 milli r, an insignificant amount at any dose level.

With each batch of exposed films, we developed some unexposed film to correct for "fog" caused by the penetrating cosmic rays during the interval from the time of manufacture to the time of use. This turned out to be insignificant.

The GAO report is full of conjecture and error. The part of the Report dealing with the Photometry Section 's misleading particularly on two aspects:

1. The report speaks of "harsh CROSSROADS conditions". The entire X-ray department of the air-conditioned hospital ship S.S. Haven was made available to my Section. No interfering medical activities were permitted as there was another hospital ship in the lagoon carrying out such normal functions. The space and equipment available was superb and was probably never approached before or after Bikini by any other film badge processing laboratory.

Colonel Warren succeeded in obtaining the services of the country's leading experts in film badge design, manufacture, shipping, handling, and developing. All operations were performed under the most carefully controlled conditions. The operating crews in the Photometry Section were trained by physicists and radiologists in academic positions, and by graduate students. Training took place daily from early June 1946 when the S.S. Haven sailed from the Oakland Navy Base, to the early part of July, when the first parties reentered the lagoon after Able. Thereafter, the Photometry activities occurred mostly at night, in supervised shifts. The results of the previous day's operation became available in the morning of the next day. People with reading over 100 milli r for the previous day were prevented from participating in the next mission(s).

The number of personnel put at my disposal was about twice what I could use effectively, hence only the more intelligent and responsible enlisted men were allowed to participate. I recall one night when we had an unexpectedly large order of films to be processed so that the job had to be finished during the following day. No one whose result was not available by morning was allowed to go out that day.

2. The other misleading statement in the GAO Report claims that the film badges were "incapable of accurately recording external beta because the portion of the film intended for that measurement actually recorded both external gamma and beta".

The Type K (dental) film that was available had been designed for dental X-ray machines. It was relatively insensitive to the high energy photons (gamma rays) at Bikini. X-ray or gamma ray photons affect the silver bromide grains in the emulsion indirectly via high energy electrons, which the photons set in motion while losing some of their energy (Compton effect). After the film is developed, the originally invisible grain becomes a black speck of metallic silver. To make the film more sensitive to gamma rays it is necessary to place an abundant supply of electrons close to the film. Lead contains about 10 times as many electrons per unit volume than paper and celluloid. Therefore, a given exposure created about 10 times more black silver grains under the lead cross than in the corners of the badge which were not covered by lead.

The softer electrons from beta emitters on the contaminated ships could not penetrate the lead shield. Hence, the area under the lead read gamma dose but not beta dose. There were a few cases indicating significant beta radiation. A member of a boarding party would take off his shirt and place his badge in contact with a box of radioactive salt or soap, or someone would carry such a box against his chest. In such cases, the corners of the badge free from lead showed significant darkening, far in access of 10 percent of any blackening under the lead. The corners were sensitive to betas and insensitive to gammas.

Two thirds of the 10,000 film badges issued during July and August showed less than 10 milli r and were recorded as indicating zero exposure. When a film showed a small amount of blackening just above the 10 milli r limit, it meant that very few grains in the emulsion had turned into silver. The cross section of the densitometer's light beam was quite small (about that of a knitting needle) so the beam could then encounter different numbers of black centers on different spots of the film. Then it could happen that different areas of the film would produce slightly different meter readings. As in all statistical situations, fluctuations increase when samples size decreases.

For the above reason, very small doses were quoted in terms of the average of several readings on the same film. However, straining the method to evaluate minimal doses was more an exercise in perfectionism than a contribution to the evaluation of gamma doses around 100 milli r.

The emphasis of gamma over beta reflects the fact that the human body is totally immersed in gamma radiation, while beta effects are restricted to a limited area of contact with the body's surface. When a significant beta exposure of a badge was not uniform, e.g. when the beta source was smaller than the badge, readings on several areas of the film would be averaged.

The Photographic Dosimetry section at Operation CROSSROAD accomplished it assigned task successfully. We had no problems arising from inadequate materials, procedures, or personnel. None of the 40,000 participants accumulated a clinically significant dose of radiation during our operation in July and August 1946.

If done professionally, film badging is a reliable and reproducible system to evaluate radiation exposure of individuals. The other method, using pencil-size ionization chambers, does not provide a permanent record.

As supporting documents, I am submitting notes taken during one of my 1947 lectures given in Washington as a guest of the Navy, and letters pertaining to my qualifications and performance by Vice Admiral Blandy, Commander of Joint Task Force One and by Mr. James Forrestal, Secretary of the Navy.

Gerhard Dessauer

GERHARD DESSAUER

COMMONWEALTH OF VIRGINIA
COUNTY OF ALBEMARLE

The foregoing instrument was acknowledged before me this 6th day of December, 1985.

Pauline T. Hoover
Notary Public

My Commission Expires: 22 Jan 88

THE SECRETARY OF THE NAVY
WASHINGTON

Dr. Gerhard Dessauer
University of Rochester
Rochester, New York

Dear Doctor Dessauer:

I am addressing this letter to you in appreciation of your services to Commander Joint Task Force ONE in connection with Operations CROSSROADS.

During these operations you acted as Chief of the Photometry Branch of the Radiological Safety Section. Your organization of, and work with the branch distinguished you as a man of marked ability. Your work proved more conclusively than any other that no personnel had obtained dangerous exposure to radioactivity as a result of the operation. Your group was responsible for the safety of several thousand persons, and it reflects nothing but credit on yourself that the safety record at Bikini was spotless. In addition, you collected scientific data which proved to be of exceptional value in evaluating the radiological effects of both explosions. This work was evidence of your exceptional scientific ability. Your services reflect nothing but credit on yourself and the nation.

For this outstanding contribution to the success of the whole operation, the Navy sends you its thanks.

Well done.

Sincerely,

James Forrestal

THE SECRETARY OF THE NAVY
WASHINGTON

WASHINGTON, D.C. 7
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1947

BUILD YOUR FUTURE
WISELY. SAFELY
U.S. SAVINGS BONDS

Dr. Gerhard Dessauer
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R-X-rads - Film Cal. from File Misc.

(N.S. 123 8-47)

PHOTOGRAPHIC DOSIMETRY

It would be impractical and very hazardous to undertake any monitoring, except in extreme emergency, without providing for some means of ascertaining the total dose of radiation to which the monitor is being exposed. At present the chief method of measuring total radiation is by photographic dosimetry. Dr. Gerhard Dessauer, now employed in General Electric's physics laboratory, was in charge of the photographic dosimetry during the Bikini operations, and the following section consists of excerpts froma lecture by Dr. Dessauer on the subject of photographic dosimetry.

The instrument for the measurement of the total daily dose had to be cheap, easy to carry, and as reliable as possible. Pocket ionization chambers and photographic films answer these requirements under normal conditions. In personnel monitoring it is customary to use both of these means, side by side. However, in the climate of the tropics, electrical leakage becomes so serious in ionization chambers that the photographic emulsion remains as the only tool for dose intergration.

The individual photographic films to be worn by people must be packedin several layers of specially prepared paper so that the resulting "film badge" is not only light tight but also especially resistant to humidity and chemical action of salt deposits.

THE PHOTOGRAPHIC PROCESS

The action of visible light on a photographic emulsion is reasonably well understood. The emulsion consists of a very large number of tiny crystals of silver bromide or some other light sensitive compound which are imbedded in gelatine. The emulsion is coated on a celluloid (film) or glass (plate) base. For increased sensitivity, two emulsions are sometimes coated on, one on either side of the base. A silver bromide crystal consists of a regular array of positive silver ions and negative bromide ions.

When a visible light quantum is absorbed inside of one of these crystals, a local disturbance is created in the crystal lattice. An electron is restored to one of the silver atoms reducing the positive ion to neutral silver. When the film is subsequently brought into a mild reducing agent (developer), the grains that had been hit by a certain minimum number of quanta (depending on the type of emulsion) will be completely reduced to black metallic silver. The grains that had only a few hits or no hits at all will remain unchanged. The crystals containing the unreduced silver ions are then washed away in a second chemical bath (fixer) and only the black grains will remain. The more light quanta fell on a given small area of the emulsion, the more developpable grains were produced there. This makes it possible to transform the image projected on the film during exposure into a "negative" image, i.e. a picture which reproduces the various shades of light as corresponding shades of black. The various degrees of blackness on a photographic film can beused for quantitative measurements of illumination.

Photographic density

In quantitative work the degrees of blackness at the various locations on thefilm must be measured accuratly.

To put the concept of blackness on a more scientific basis one introduces the idea of "photographic density" which might be explained as follows. Suppose that a parallel beam of light of intensity I_o is incident on a light tight screen which has a small hole. Furthermore, suppose thatthe light getting through the hole (or "diaphragm") falls on a photoelectric cell connected to a circuit which allows the evaluation of the light intensity in terms of a simple reading on an electrical meter.

If the exposed and developed photographic film is placed just behind the diaphragm, the light intensity getting to the cell will be reduced by an amount that depends on the blackness of that part of the emulsion which faces the diaphragm. If the reduced intensity is called I, the ratio I/I_o will represent the fraction of the light that gets through, or the so-called transmissivity at this particular spot of the emulsion. The blacker the film the smaller will be the transmissivity. We should like to use a quantity which increases with blackness. We could take the reciprocal of the transmissivity, I_o/I and call log of it the photographic density, D. $D = \log_{10} (I_o/I)$

An instrument for the determination of density consisting of film table, diaphragm, photocell, circuit, and meter is called a densitometer. The Ansco Sweet densitometer, model 11, which was used at Bikini has a large linear scale which is calibrated in density units and reads from zero to a density of 3.

If the film is perfectly transparent, $I = I_o$ and $D = \mathrm{Log}_{10} 1 = 0$. Even if a film was never exposed , a few grains will always be reduced in development, so that density zero never occurs. The density of an unexposed developed film is called its fog. The fog may vary from very small quantities to as much as 0.2 or higher, depending on the type of emulsion and its age. The fog must be subtracted from the density reading of an exposed film. Therefore it is always necessary to develop "blanks" along with the films that have been exposed.

A density of 1 results when $\log 1_o/1 = 1$, or $X = 1/10\ 1_o$, which means that the film passes 10% of the incoming light. Similarly, density 2 corresponds to 1% transmission, density 3 to 1/10% transmission, etc.

Photographic effedts of neculear radiations

Gamma rays and neutrons have very little direct effect on a photographicemulsion since their absorbability in a thin sheet of matter is negligible compared to that of light. Beta rays, however, are very efficently absorbed. The ionization and excitatio produced by a fast electron traversing an emulsion grain are so numerous that every grain hit by beta ray becomes developable.

The main hazard in radioactively contaminated areas comes from the gamma rays. The alpha rays and most of the beta rays are slowed down or completely absorbed in air before they can reach the human body. Therefore, it is necessary to make the films sensitive to gamma rays by some indirect process. When gamma rays are absorbed in a slab of heavy metal most of their energy is transformed into kinetic energy of electrons which are released in this material.

When such a metal foil is placed in contact with the film badge, a considerable fraction of the incident gamma intensity is transformed into a stream of fast electrons which will then effect the emulsion efficiently just as beta rays would. There is an optimum thickness for the metal foil. Increasing the thickness beyond this value is useless as electrons releases on the exposed side of the foil would be completely stopped in the foil. They would not be able to penetrate to the film and hence would add nothing to the photographic density.

In the monitoring work at Bikini the film badges were equiped with lead intensifying strips, 20 thousandths of an inch thick, which were bent around the wrapping of the films (see figuro 1,b and c). There are also ways of "intensifying" neutrons. But this type of radiation dows not concern us here, since neutrons are not among the after effects of the atomic bomb.

The film badge and its calibration

The film badge that was used at Bikini is sketched in figure 1, Figure 1,a showes the special tropical envelope supplied for these tests. Since there were about 10,000 such badges processed at Bikini an identification number had to be inscribed on each badge envelope. This was done by means of a grease pencil (china marking pencil) or with a rubber stamp. Removal of the tropical envelope reveals the lead covered film packet (figures 1,b and 1,c). These packets aremanufactured on a commercial scale by the Eastman Kodak Company of Rochester, New York. They come in boxes labeled: "72 Special Cross Shield Packets; Kodak Industrial X-ray Safety Film Type K". The packet itself has the same dimensions as the familiar dental X-ray film packet: 1 3/4" by 1 1/4". Upon removing the lead strip (figure 1,d) and the bottom seal (figure 1,e) of the packet, we find black cover papers (figure 1,f and 1,h) and, between them, a photographic film(figure 1,g.). This film carries a double coat (on either side) of the kodak Type K Industrial X-ray emulsion. It is so sensitive that doses as low as .05 roentgens (= one half daily tolerance dose) can still be measured.

A typical dose-versus-density curve is shown in figure 2. The density is evalucted on four points of the developed film, located half way between each pair of adjacent corners about 1/8" inside the edge. During exposure these points are covered by lead intensifier on both sides of the emulsion. The average of these four readings is called the gross density. From this, one subtracts the fog as evaluated in a similar way from a blank film. The resulting difference is the "net density". Figure 2 gives the dose belonging to the evaluated net density.

If a large number of film boxes is ordered from Kodak or if the boxes areordered at several month intervals, the emulsion on the films will generally not be the same (compare "emulsion number" printed on label of film box). Both fog and calibration curve change from emulsion to emulsion. In a laboratory in which great quantities of these film badges are used it is therefore necessary to recalibrate the films from time to time. This is accomplished by suspending a number of film badges in air at measured distances from a small radium source.

Both source and film should be as far away from the walls, ceiling and the floor of the room as possible to eliminate scattering. If there is no radiation scattered back on the film, the dose received is related to the amount of radium (in milligrams), th distance source to the badge (in cm) and the time of exposure t (i hours) by the following simple formula: $D = \frac{6.4 \times X t}{r^2}$ where d is the dose in reentgens, For example, if the badges are mounted on a circle of radius 29 cm arround a source containing 10mg of radium, we get: $d = .1\ t$ (reentgens). Now we may expose one of the badges for half an hour, another for one hour, others for 2,4,8,10, and 20 hours, while we keep one aditional badge unexposed in order to determine the fog. These badges will then receive respectively .05,.1,.2,.8,1.0,2.0 and zero reentgens. After they have been processed in a standred manner to be described below the resulting densities are read, the fog is subtracted, and a new calibration curve is plotted on semi-log graph paper, of the type illustrated in figure 2. Frequent calibrations of the same emulsion will give valuable data on the realiability of the photographic method of dosimetry. Tt should be better than plus or minus 20%.

If the film badge carrying monitors had exposures consisting predominantly of beta rays, this will show up on the films. Now the corners will be blacker than the areas under the lead crosses. In such cases densities are read in the four corners and the beta exposure is evaluated from a beta calibration curv. Such a curv can be prepared by placing film badges for vairous periods of time in direct contact with a sheet of uranium metal (about 1 millimeter thick). The daily tolerance dose is the equivalent of two hour exposure to uranium. It is assumed that the uranium metal (contain a definate fraction of beta emitting decay products UX_1 and UX_2) covers the entire surface of the human body.

The daily tollerence dose for gamma rays has been set at 0.1 roentgens. Our type K film badges permit the measurment of doses down to $\frac{1}{2}$ and up to about 30 times the daily tollerence. At Bikini doses had to measured on day to day basis. In factories and Laboratories where workers and scientists are being monitored it is customary to let them wear the same badge for a week at a time. The question is then whether the man received more or less than .7 roentgens. Apparently (figure 2) the tupe K film has an ideal rang for this measurment.

Processing of the badges:

In a large operation such as Bikini where a total of approximately 10,000 personnel monitoring films were handled, it is necesary to adhere strictly to a system for the processing of the badge Every badge was identified bya number written or stamped on the outside envelope (figure 1,a). These numbers were also listed in data books which provided a line extending over two pages behind each badge number for the entry of date. At the time the badge was issued the name of the person and the date and time of issue were recorded in the book. When the badge was returned, as much pertinent information as could be obtained about its history was entered on the proper line of the data book: Number of days worn (usually one), probable times of exposure, character of mission of the wearer, etc. After the badge had thus been "logged in" it was handed to the dark room crew. The first operation in the dark room consisted on the opening of the badge under an x-ray safe light such as the

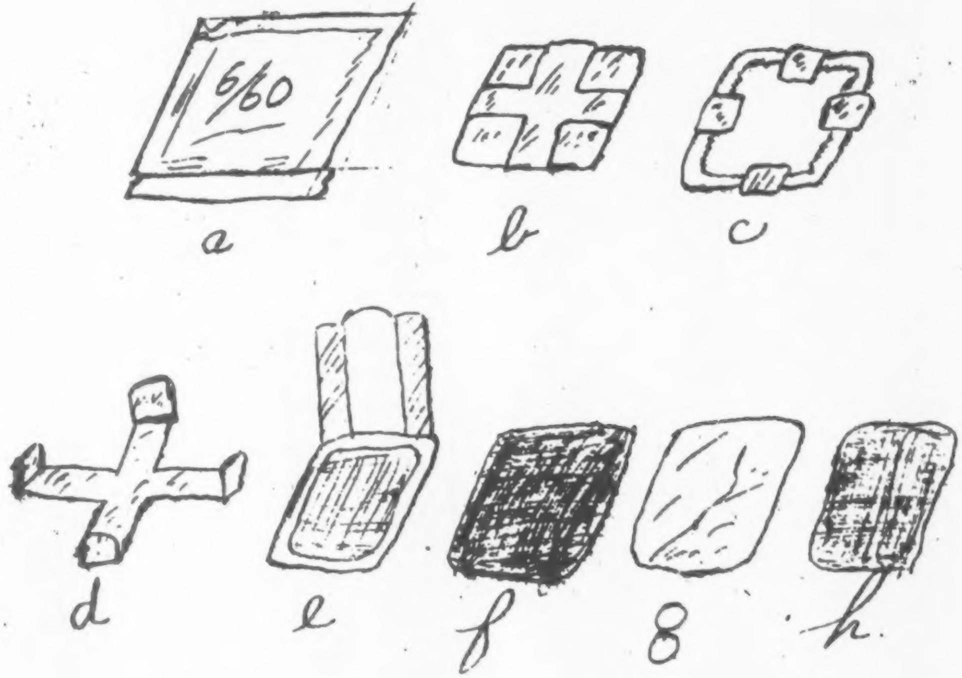
Wratten series 6B, or 1. In this operation the number of the badge was copied with lead pencil directly on the film, somewhere in its central area. Lead pencil marks survive the chemical baths of the dark room very well. The film was then clipped into a special holder which accomodated a total of 12 films. This holder was immersed into the developer, and a timing clock was started at this moment. (Actually up to 20 holder could be put into the developing tank at a time). Development lasted for exactly four minutes whilb the solution was under continuaus agitation. When the four minutes were up, the time clock rang and film holders were quickly withdrawn from the development tank and rinsed with distilled water, the developing solution consisted of "Kodak Liquid X-ray Developer containing Kodalk" which had been diluted with carefully distilled water according to the instructions on the bottle. One of the most important points in the development is the control of the developer temperature. It must be held at 68° Fahrenheit within less than one degree. A ten gallon tank full of developer will last for about 5000 films, especially when calibration films are used at regular intervals. After the rinsing, the films were immersed in another 10 gallon tank containing properly diluted "Kodak Liquid X-ray Fixer", where they remained for 30 minutes. After an hour's washing in running water the films were then hung up to dry. When they had become dry, the pencil identification numbers were written over with ink.

The films were then handed to the densitometer crew who entered four density reading for each film in the data book. They also entered the average fog of some blanks that had been developed along with the exposed films. These blanks had had the identical previous history as the monitoring films except that they never left the laboratory. Finally, the log books were given to a man who would look up the doses belonging to the respective net densities, on the calibration curve, and enter them in the proper spaces. The films were then filed away in size one coin envelopes.

At the end of the working period (often long after midnight) a list would be prepared of the names and doses of all monitors who had received more than 0.1 roentgen during the preceding day. As there were a great many cases of slight overdoses, especially after test Baker, a personal card index file system was also set up. Each monitor had his own card on which his doses were recorded, dayafter day.

For good results the films had to be treated properly before they were used as well as during processing. They had to be stored in a cool, dry place free from penetrating radiations (such as ship's X-ray machines). Fortunately, the U.S.S. Haven which accomodated our laboratory was airconditioned throughout. Further detail on the processing of radiographic film will be found in the excel* lent booklet "Radiography of Materials" published by the X-ray division of the Eastman Kodak Company of Rochester, New York.

FIG. 1 THE FILM BADGE


6/60
a
b
c
d
e
f
g
h

Paul - This is all I have for ABLE, rest of the [illegible]

SECRET

Appendix I - Personnel Film Badges

A. Abstract. Personnel film badges were distributed to all members of the task force who might be exposed to radiation. Analysis of these films indicate that no one obtained physiologically significant radiation doses. Only ten badges gave readings greater than 0.1 roentgen.

B. The purpose of these films was to measure the gamma ray dosage obtained by any personnel of JTF-1 who might be exposed to radiation

C. These films are specially calibrated X-ray film (Type K emulsion with a sensitivity of 0 to 2 roentgens. They are placed in a suitable holder to be worn by personnel operating in contaminated areas. A total of about 4000 of these badges were distributed during Test Able, a new badge being given to each person on successive days.

D. The dosages measured on most badges were far below the daily tolerance. Only ten badges showed a dose greater than 0.1 roentgen. Two of these were greater than 2 roentgens, but these results appeared questionable in view of other badges carried by personnel under the same conditions. Apart from these two cases, the daily dosages were in the neighborhood of 0.1 to 0.2 roentgen. The four monitors on the B-17 drone plane mothers recorded doses of 0.11 to 0.15 roentgen. Most of the lagoon patrols averaged a daily dose of 0.05 roentgen or less. A summary of the badges which recorded the higher dosages is given in Table 1.

E. It may be concluded from the analysis of these film badges that no personnel of the task force obtained a physiologically significant radiation dose.

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SECRET

IN REPLY REFER TO:

JOINT TASK FORCE ONE
Navy Department
Washington 25, D.C.

CJTF-1/013ES

24 October 1946

Dr. Gerhard Dessauer,
45 Edgerton Street,
Rochester, New York.

Dear Dr. Dessauer:

It gives me great pleasure to write to you at this time to express my sincere appreciation for the efforts you have put forth as consulting lecturer in physics and nuclear physics in the Radiological Safety School, JTF-1, Navy Department, Washington, D.C.

It is essential that the Navy, as well as other branches of the service, be prepared as quickly as possible to cope with the problems of atomic warfare. Immediate action to train personnel to discharge the Navy's responsibility for preparedness in this field is believed imperative. Toward this goal you have been of great assistance. In view of the very short period of time available for preparation for the Radiological Safety School your untiring efforts have been even more appreciated.

Following test Baker, Operation Crossroads, it became obvious that additional radiological safety personnel had to be trained in order that the job at hand could be completed. Of necessity, this had to be an emergency course of instruction and of short duration. This course, made your participation much more difficult.

The cooperation between the highest type of civilian scientists and the services has been of great comfort and assistance to me as Commander Joint Task Force One.

I wish to express my heartiest thanks to you.

With kindest personal regards, I am,

Very sincerely yours,

W H P Blandy

W. H. P. BLANDY
Vice Admiral, U. S. Navy
Commander Joint Task Force ONE

C-84210

Chairman MURKOWSKI. With regard to the internal radiation dose estimates, why does DNA not use the whole body counter to measure internal radiation on the Crossroads veterans?

Dr. Gillespie.

Dr. GILLESPIE. As was alluded to earlier, there is some disagreement as to the effectiveness of this approach. However, I think the direct answer to your question is that DNA is basically not that kind of organization—that is not our job. That is not the kind of business that we are in. That would be more appropriate for the Veterans' Administration.

Chairman MURKOWSKI. The question of determining the dose, is that not your business?

Dr. GILLESPIE. Yes, sir, it is.

Chairman MURKOWSKI. Is that not the question, then, what dose is reasonable?

Dr. GILLESPIE. That is correct. Now, what the whole body counter could tell you is their body burden today.

Chairman MURKOWSKI. Well, yes, but you can figure that out, can you not, by calculating?

Dr. GILLESPIE. You could attempt to work back from that to the exposure at the time, yes, sir.

Chairman MURKOWSKI. Well, is there a reason you have not done it?

Dr. GILLESPIE. Well, we have not believed that it was necessary to do in order to establish the facts that we thought were needed in these cases.

Chairman MURKOWSKI. I am a little confused. Why is it not practical to do, because I assume it will assist you in coming to some substantiating conclusion, will it not?

I mean, it is either a procedure that is worthwhile or it is not, and the fact you have not done it is evident. I am asking from the standpoint of your professional opinion, if you do it, is it going to be helpful or is it not?

Mr. BRITTIGAN. Mr. Chairman, I may be able to help a little bit in this regard by way of clarification.

Chairman MURKOWSKI. Please, Mr. Brittigan.

Mr. BRITTIGAN. DNA as an entity does not have a whole body counter. We, of course, are aware of the location of several whole body counters, some in military facilities, some in Veterans' Administration facilities, and some in facilities operated by the Department of Energy.

In some cases, where there has been litigation or claims involved, whole body counters have been used. Also, in some cases, laboratory techniques have been used with respect to tissue samples. The results in those cases have failed to demonstrate any accumulation above normal background in the tissues of interest.

Chairman MURKOWSKI. Well, gentlemen, you work for DOD. DOD has this capability. What we are attempting to do here is to get the professional opinions and recommendations which, of course, is what your testimony is all about. But one has to, when we start asking a few questions, wander into the reality of why you have not done it. The excuse that you do not have one really is not satisfactory to me. You could come to this committee, we would get you one, or we would get you access to one. The fact that DOD has one and it would seem to me, since this has been brought up during this hearing that this is an application that has some scientific foundation. The goal of this committee is to try and obtain enough information where we can make some recommendations to the Congress on something that has been sitting around for 40 years. Why professionally you do not help us build the mousetrap?

And I am not suggesting you are not helping, but it appears to us that this is an obvious break in the chain of investigative activities that would be appropriate.

Anybody?

Dr. **Gillespie**. I think what we would like to do is get back to you on that for the record. I am aware that a couple of years ago, the idea was suggested, and I believe that it has been reviewed by someone. But I would have to find out what the status of that is.

General **Pickitt**. We will be happy to provide that for the record.

Chairman **Murkowski**. I am sure that as you address the responsibility that you have in undertaking this effort that you are aware of the objective of the committee; is that not correct?

General **Pickitt**. That is correct.

Chairman **Murkowski**. It would appear that since this technique has a known application that it may be useful. I am curious to know why it was rejected. I would assume that it is not necessary that you be told or directed specifically to follow a procedure, because obviously you know much more about the problem and the alternatives than the committee or the professional staff associated with the committee.

General **Pickitt**. Mr. Chairman, we certainly have no interest nor enthusiasm whatsoever to be counterpurpose to yours. While we cannot definitely answer your question at this time, we believe this whole body counter has been previously evaluated. I recommend that we take your question for the record and get back to you with a formal answer that the whole body counter should either be used or there should be a legitimate, logical, and scientifically supportable reason why it is not used. And that should be available for all of us to consider.

Chairman **Murkowski**. Thank you, General. When will that be available?

General **Pickitt**. We would propose to have it to you the middle of next week, sir.

Chairman **Murkowski**. OK, because at that time I intend to direct, pending your specific comments on this, that the DOD and the VA initiate it. Of course unless I am convinced otherwise that it would be pointless, but I am not convinced of that now, and I will look forward to your specific comments as soon as you have had a chance to reflect on it.

It just seems a rather obvious area that has been overlooked with no apparent explanation.

[The following information was subsequently supplied for the record:]

Defense Nuclear Agency
Washington, D.C. 20305-1000

30 DEC 1985

Honorable Frank H. Murkowski
Chairman, Committee on Veteran's Affairs
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

During the December 11, 1985 hearings before the Committee on Veteran's Affairs of the United States Senate, I promised to provide you with my perspective on the diagnostic devices known as whole body counters. These devices are used to determine the internal radionuclide commitment to individuals, and consist of heavily shielded radiation counters viewing a cavity large enough to accommodate a person. There are several such devices distributed about the country, and used primarily for diagnosis of nuclear accident victims. They will only work for high levels of contamination and for specific contaminants. Other methods exist for making the same determination which avoid these difficulties, but require tissue or excretion samples. The Congress recognized the potential usefulness of these methods in Public Law 98-542, which directed the National Institutes of Health (NIH) to report on the most useful methods and their applications.

The Defense Nuclear Agency (DNA) has not employed such devices for dose determination in the past for two reasons: First, the internal doses to atmospheric test participants were so low as to be below the detection thresholds of most of these devices; second, DNA does not have the charter to provide whole body counts for these veterans. I would be happy to join with the Veteran's Administration (VA) in some arrangement for such counts. I would envision supplying the information which would allow the VA to provide this service to those most likely to give a positive reading. Veterans' organizations could nominate additional persons to undergo the procedure. The VA would then provide the counting service. I would recommend awaiting a preliminary NIH response on PL 98-542, due in May, before implementing this strategy, however.

I will keep abreast of ongoing efforts of NIH in this area, and will be entering discussions with the VA in the interim, in order to determine ways to proceed. I will keep you informed of progress.

Sincerely,

John L Pickitt

JOHN L. PICKITT
Lieutenant General, USAF
Director

Chairman MURKOWSKI. You state in your testimony that personnel decontamination procedures were adequate and generally appropriately followed. There have been some pictures that have been introduced with regard to ships after the nuclear tests.[1] The first one shows a contrast—some individuals wearing protective clothing and no protective clothing on others; a guy is smoking and the other guy is welding. The significance of that is neither here nor there—other than they're aboard the U.S.S. *Hughes* during preparations for towing after the Crossroads exercise. The question is, does this photo indicate that adequate protections were taken? Allegedly, the same vessel in 1948 at Puget Sound Shipyard shows workers wearing protective shoe covers and gloves and so forth. But I have been in the hold of enough vessels that I am not convinced that that shows anything but an old vessel.

Could you comment on the significance of these from the standpoint of any definitive analysis as to the issue of adequate protection or the fact that this ship may show scales from its exposure to radiation or rust or whatever?

General PICKITT. The picture in your right hand, Mr. Chairman, depending on the timing at which that decontamination effort was taking place, if it were after Shot Able, there was no effective contamination after a matter of days; therefore the type of protection that one would normally wear in a volatile environment would not be required.

Even after a period of time, on Baker, the protection you see could be applicable if the ships had been washed, as they were washed down and had been essentially decontaminated of loose radioactive particles except for the deeper radiation that was embedded.

When you get to the shipyard as shown in the later picture, the purpose of taking those vessels into the shipyard was to remove the deeper embedded radiation, and in order to do that, they had to sandblast and take those down to essentially clean metal. The difference between the two environments, one at sea in which you have accomplished initial decontamination procedures, which we have provided you in more detail, removed the crews from a volatile environment where they are susceptible to radiation by ingestion. They are also working in a wet environment, washing and scrubbing which suppresses dust.

In the shipyard, where you are sandblasting, you are very clearly stirring up an environment in which there is a greater potential danger, so one would use different protective devices covering in those two circumstances.

Chairman MURKOWSKI. Senator Cranston, I have no further questions.

Thank you, General.

Senator CRANSTON. Thank you very much.

I would like to ask one question in relation to what you were just saying.

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[1] See p. 388.

If we were conducting Operation Crossroads again and sent in men immediately afterwards on the ships, would you send them in with or without protective clothing, given what we now know?

General PICKITT. On the initial entry, Senator?

Senator CRANSTON. Yes.

General PICKITT. We would always proceed from the most cautious and protective position possible.

Senator CRANSTON. You would give them protective clothing now which they were not given then?

General PICKITT. Sir, they were then. They were given protective clothing.

Senator CRANSTON. Well, what are these photographs of people on ships that are not protected?

General PICKITT. Those picture were taken after the ships had had protected monitoring teams go on board with monitors and with detection equipment to determine if the environment was safe, so that workteams could be cleared on board. Each workteam was also accompanied by an experienced and trained monitor to monitor the dosage that members each of the team accumulated, so that they could be evacuated from the ships before anyone accumulated excessive radiation.

Senator CRANSTON. I do not think there is any evidence that the first monitors that went in wore protective clothing. But my question to you is, would you permit the people that we see photographed there without protective clothing today to go in under similar circumstances without protective clothing?

General PICKITT. I think we would approach it in the same way we did then, sir.

Senator CRANSTON. You would send them in without protective clothing?

General PICKITT. They went in with protective clothing until the environment was confirmed to be safe for people without special protective clothing.

Senator CRANSTON. Well, we have photographs of people without protective clothing on those ships shortly after the tests. Would you permit them today, given our current state of knowledge, to go in without protective clothing as photographed?

General PICKITT. If the environment had been checked and been deemed safe, exactly as it was done in 1946, sir.

Senator CRANSTON. Do you have any photographs of anyone wearing protective clothing at that time?

General PICKITT. Yes, sir, we do.

Senator CRANSTON. Would you submit those for the record, please?

General PICKITT. Pleased to, sir.

Senator CRANSTON. Why were they not shown to GAO?

General PICKITT. I believe they were shown to GAO.

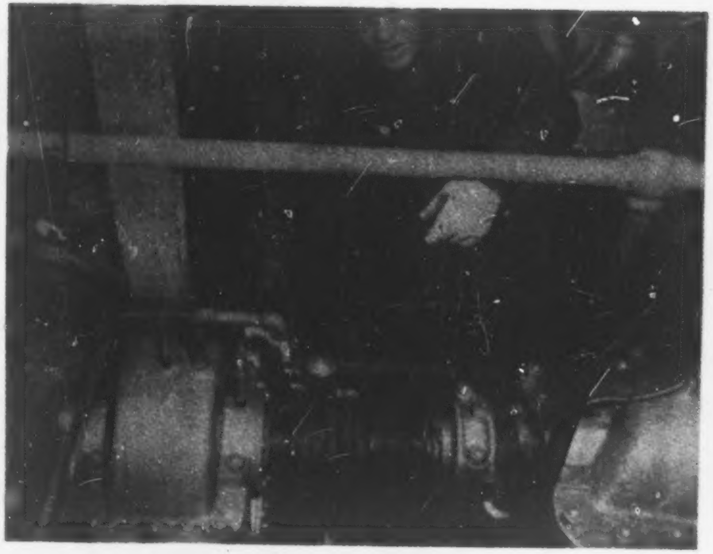
Senator CRANSTON. GAO states in this report that it saw no such photographs. So we have a discrepancy.

But anyway, submit them to us for the record, please. Would you indicate on each picture where it was taken, when it was taken, and other data, as you submit them for the record?

General PICKITT. Yes, sir.

Senator CRANSTON. Thank you.

[The following photographs were supplied for the record:]



Interior inspection of PENSACOLA (CA-24) after Baker.

U.S.S. CONYNGHAM (DD-371) boarding team inspecting ship, July 31, 1946.

One man inspects flipped float plane on NEW YORK (BB-34) after Baker.

NIAGARA (APA-87) one man views an airplane on deck after Baker.

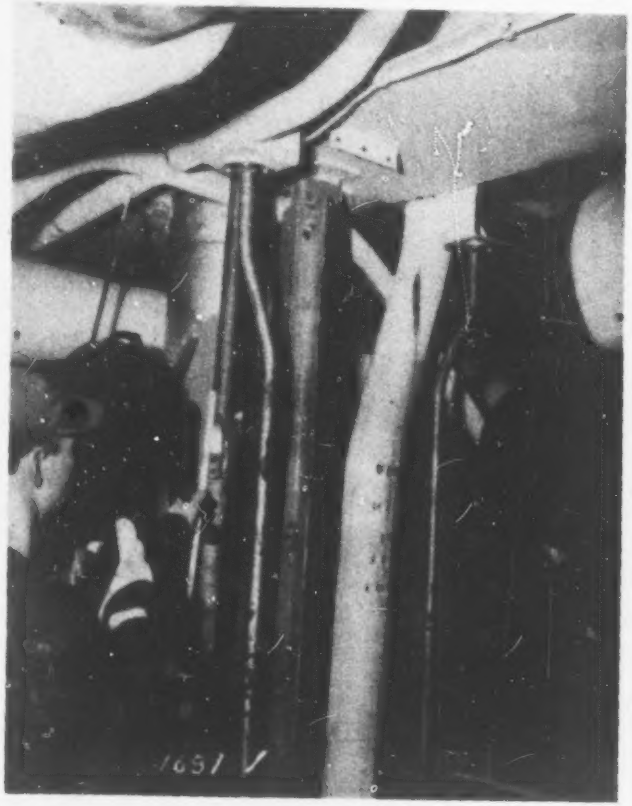
One man in engine room of PENSACOLA (CA-24) after Baker.

Bureau of ordinance inspector on U.S.S. HUGHES (DD-410) on August 5, 1946.

Man emerging from interior inspection after Baker.

ABCR-78-1954-6

RADM Solberg emerges from interior inspection after Baker.



Interior inspection of PENSACOLA (CA-24)
after Baker.

After Baker.

Two men walk the deck of an APA after Baker.

Senator **Cranston**. In the GAO report, there is a photo on page 31 of a work crew hosing down the superstructure of one of the target ships, which I have been told was taken on board the U.S.S. *Salt Lake City* on or about August 6, 1946. What information is available about the level of radiation on the *Salt Lake City* on that date?

Mr. **Boren**. Sir, that is that photograph on the right,[1] and it is not clear that that is the date. Let me explain how GAO came with that——

Dr. **Gillespie**. Hold it. You need to identify yourself.

Senator **Cranston**. Yes, if you would identify yourself.

Mr. **Boren**. My name is Paul Boren.

Let me explain how GAO——

Senator **Cranston**. What is your capacity?

Mr. **Boren**. I am the Assistant NTPR Program Manager. I worked with Mr. Baney extensively on their audit.

Senator **Cranston**. Thank you.

Mr. **Boren**. The photograph on your right was undated and has no indication what the ship was. There were three photographs of actual ship decontamination operations, with people aboard the target vessels hosing down the ships. One of the—only one of those three were dated. That photograph was ignored by GAO because it was taken prior to Baker. The other two that you see there are undated and it gives no indication of what ship.

GAO asked us to try to identify these photos. I passed it on to a weapons effects expert, and he said that the ship on the left is a submarine,[2] and, that based on something on the bow, it was probably the *Skate*, although he could not tell, and based on the background of the ships, it was probably after Baker, but it is so far away he could not be certain.

In the photo on the right, the damage there that you see, he said, was probably caused by Test Baker and could possibly be the *Salt Lake City*. He was not sure about any of this, and I related this all to GAO. GAO said thanks, and asked, when were the first days that these people could be aboard those vessels after Test Baker.

And I said, probably August 5 or 6.

That is how they came to that conclusion. So it is all very speculative, and I think that should be made very clear.

Senator **Cranston**. Thank you very much.

Let me go on regarding that circumstance. The GAO testified earlier that based on Defense Department records, the maximum radiation level on the outside surfaces on that day on the *Salt Lake City* was 100 rem per 24 hours. Could this be possible, and if so, at what risk would the sailors have been who are shown in that photo?

Dr. **Gillespie**. I believe it is possible that the radiation dose could have been that high somewhere on the ship, and the second part of your question was, I believe, would that represent a hazard to someone in a radiation field of that level if they stayed there for any appreciable length of time. Well, of course it would.

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[1] See p. 385.
[2] See p. 386.

The point is that there were monitors on board the ships to identify areas such as that and keep people away from them.

Senator CRANSTON. How would you define an appreciable length of time?

Dr. GILLESPIE. Well, if the radiation rate is at 100 R per 24 hours, and the maximum limit is one-tenth of an R, then the length of time they can stay there is 24 hours divided by a thousand.

Senator CRANSTON. Pretty short time, then?

Dr. GILLESPIE. It is a short time, yes, sir.

[The following information was subsequently supplied for the record:]

The 100 R/24 hours reading for *Salt Lake City* was the maximum reading on the ship on August 6, 1946. The reading was from the inside of a laundry chute; this means that a sailor could spend one and three quarters minutes inside the laundry chute and still avoid exceeding the operational limit of 0.1 R per day. Since no sailor ever went inside the laundry chute, this dose is academic.

The decontamination team simply flushed out the inside of the laundry chute with sea water. This washing reduced the radiation readings to 8.0 R/23 hours.

The average topside reading for the *Salt Lake City* on August 6 was 2.0 R/24 hours.

Senator CRANSTON. In the DNA's rebuttal to the GAO's contentions about personnel decontamination procedures, it is stated that "the chief of the radiological safety section at Crossroads established personnel decontamination procedures in the early days of the Manhattan Project at Oak Ridge. Technical personnel from Oak Ridge and other Manhattan Project laboratories were well experienced in personnel decontamination."

What was known about radiological decontamination procedures of a contaminated ship prior to Shot Baker? Was that not the first experience ever with such a situation?

Dr. GILLESPIE. You specified, Senator, with respect to a ship. As far as I know, these were the first ships that were ever exposed to contamination. I think, though, going to the earlier part of your question, there was extensive knowledge and understanding and experience with situations of contamination in very similar circumstances, that is, the radioactive material that was the contaminant was the same at Crossroads as it had been in other accidents and incidents that had occurred in the Manhattan Project in particular. So there was extensive experience with contamination.

Senator CRANSTON. None had been carried on with a contaminated ship, in other words? No prior tests with a contaminated ship?

Dr. GILLESPIE. These were the first tests in which ships were involved.

Senator CRANSTON. When the target ships were hosed down by support vessels with saltwater within 10 days following Shot Baker and prior to reboarding, how likely is it, in your estimation, that the water itself was radioactive?

General PICKITT. It was almost certainly radioactive, but less so than the coral dust and loose debris on the ship decks. Moreover, the water had a degrading level of radiation with time.

Senator CRANSTON. Would you provide us with records to substantiate that?

General PICKITT. Yes, sir.

Senator CRANSTON. The not very much, and so forth?

General PICKITT. Yes, sir.

[The following information was subsequently supplied for the record:]

> The following is a direct quote from Director of Ship Material Technical Report, radiological decontamination of threat and non-target vessels, (XRD-185), Vol. 1, pages 5-6.
>
> . . . on 27 July, some of the fire fighting vessels of the Salvage Unit (TU 1.2.7) were employed to wash down with salt water HUGHES, which had been beached in radiologically clear water. After a wash down of about two hours duration, radiation readings revealed that the intensity had been reduced about fifty percent. A second . . . washing under similar conditions produced no similar reduction . . . The reduction in readings obtained was most encouraging and, although much of it was due to natural decay, there was no doubt that considerable acceleration had been produced by the processess being used. . . . It has been found from experience in the period since Test Baker that water slightly contaminated tended to deposit its contained radioactive materials on surfaces of systems and equipment exposed to sea water and in marine growths on underwater bodies of operations vessels. It was therefore necessary to wait until the salt water surrounding the target vessels was radiologically clear before proceeding with washing.

Senator **Cranston**. On page 106 of the DNA's 1984 historical report on Operation Crossroads, there is a photo with the caption "Welder aboard U.S.S. *Hughes* during preparation for towing it after Crossroads."

What is the approximate date of that photo?

Dr. **Gillespie**. Again, sir, you are asking a very detailed question. Mr. Boren will answer that.

Senator **Cranston**. Well, if you do not happen to have the date, you can supply it for the record.

Mr. **Boren**. There is no date, but I would like to identify it. It is definitely not July 28 like GAO says, and I can tell you why.

On July 27, the *Hughes* was hosed down first with saltwater and then with foamite. Foamite is a chemical firefighting substance. Foamite is white and turns the ship white when it is used. The *Hughes* was then towed and beached at Eneu Island. On page 112 of this report, it shows the *Hughes* several days later still covered with foamite, and it is quite clear from the photograph used by GAO that there is no foamite on that ship. It is unmistakable to see foamite on a ship.

Senator **Cranston**. What was the radiation level on the *Hughes* on that date?

Mr. **Boren**. Offhand, I do not know, but I can certainly supply it for you for the record.

Senator **Cranston**. If you would, please.

If you could give us documents supporting what you just said about the *Hughes* also, that would be great.

[The following information was subsequently supplied for the record:]

The photograph of the towing team is undated, but did take place after test BAKER. The following table shows the dates USS HUGHES (DD-410) was towed after BAKER, and the radiological levels on that day. All readings are in roentgen per 24 hours. Thus, the dose from the reading could be obtained only by remaining on board the ship for 24 hours. Towing preparations are normally completed within 15 minutes. Towing parties were under the same guidance as other task force personnel to keep radiation exposures under 0.1 Rem per day. Prior to boarding, a monitor would establish the permissbale time aboard to avoid an exposure above 0.1 Rem.

DATES WHEN USS HUGHES (DD-410)
WAS TOWED AFTER TEST BAKER

Date	Radiological Readings in R/24 hours	Location of Reading
26 July 1946	7.0	Port Amidships
	10.0	Port Amidships
12 August 1946	0.24	Port Amidships*
	0.24	Below Decks*
	0.85	Topside*
20 August 1946	0.15	Port Amidships*
	0.15	Below Decks*
	0.52	Topside*
22 August 1946	0.13	Port Amidships*
	0.13	Below Decks*
	0.48	Topside*

* - Computer calculated from readings on other dates

The ships deck logs and CROSSROADS records provided to the committee reveal the following sequence of events for HUGHES (DD-410):

Date	Action
25 July	BAKER detonation
26 July	HUGHES towed to Enyu Island for beaching
27 July	HUGHES washed with sea water. HUGHES then washed with foamite and imcompletely washed off with salt
27 July	water. HUGHES was then washed again with foamite and allowed to stand overnight.
28 July	HUGHES washed with salt water. No towing operations occurred.
29 July	HUGHES washed with foamite and salt water.
12 August	HUGHES retracted (towed) from beach by salvage tug and moored to a buoy west of Enyu Island.
20 August	HUGHES towed and docked for inspection in ARD-29.
22 August	HUGHES undocked from ARD-29 and taken in tow by USS SHAKAMAXON (AN-88). Moored to buoy.
28 August	HUGHES decommissioned. Ship towed on an unspecified date to Kwajalein.

Senator **Cranston**. In your judgment, would participation in a welding task in a radiation-contaminated environment have created an additional risk of radioactive exposure?

General **Pickitt**. Yes, sir, it clearly could.

Senator **Cranston**. Why does DNA, as indicated in your response on the draft GAO report, believe that, other than the one open wound case mentioned by Dr. Bradley in his book, "No Place to Hide," no other injuries such as cuts, scrapes, lesions, or other open skin wounds occurred among the 42,000 Crossroads personnel during the period of this operation?

General **Pickitt**. Two factors, principally, Senator.

One, after checking 35,000 records, there was no evidence that we could find of anything in the medical reports indicating that there was medical treatment of such wounds.

But the most pervasive evidence, in my view, is that in that tropical environment, any abrasion or scratch that breaks the skin is extremely susceptible to infection and can almost be counted on to become infected in very near term unless it is properly treated. There was no evidence of such.

Mr. **Boren**. Sir, I would like to point out that Dr. Bradley's book, which I saw you reading there, also documents only one case. He said there was only one case, and that occurred in late August.

[The following information was subsequently supplied for the record:]

I would like to make another point, Sir. We are not saying that small scrapes and cuts did not occur. I'm sure they did, but they are not a significant biological hazard. The body's natural defense mechanism works to prevent contamination. If you have a cut, the veins and arteries collapse to avoid the intake of contaminants. The bodies' fluids flush the wound, and scabbing materials expel the contaminants.

What is a hazard is if the contaminated object is never removed. In our worst case reconstruction, we assumed that a one centimeter contaminated piece of steel is stuck in a person's body forever. It must remain in your body forever to permit the 100% transfer of contaminants. We assumed that a one centimeter piece of steel, never removed, is the worst situation in which you would not seek medical attention, and this did not lead to a meaningful internal dose. I can't imagine a sailor letting a one centimeter splinter remain in his body. If he removed it and cleaned it, he would have a smaller internal dose than our worst case.

Senator **Cranston**. On page 16 of the GAO report, mention is made of an additional DNA document which was reportedly to be released this year entitled "Internal Dose Assessment, Operation Crossroads," evaluating internal contamination through inhalation of radioactive particles.

When do you expect that document to be available?

Dr. **Gillespie**. That document is in security review right now, and we hope it will be released just in a matter of days or weeks.

Senator **Cranston**. Thank you very much.

Because the chairman was not here to call me to order, I have exceeded my 10 minutes, so I will subside and yield to you, Jay, if you have some questions. And forgive me for taking so long.

Senator **Rockefeller**. General Pickitt, I was not listening totally closely, but I thought that you said that there was a larger proportion of deaths attributable to cancer in the general population than there was among atomic veterans. Did I hear that correctly or wrongly?

General **Pickitt**. It is about the same, sir.

Senator Rockefeller. About the same?

General Pickitt. Yes.

Senator Rockefeller. In the coal mining business, it used to be that of all those who worked in underground coal mines for a period of years, many of them got black lung. Black lung is not cancer, but to those who have it, it is like cancer, and it eventually snuffs out one's life. This is why the State governments and Federal Government have set up trust funds to provide black lung benefits.

One can argue about whether there should be a presumption that black lung resulted from the person having served *x* number of years in a coal mine underground. A number of us went through this debate a decade or so ago, and it seemed to us to be fair to say that if a miner had worked in the mines for 10 years or more, and all of a sudden spots show up in the lung, that it is fair to provide a presumption concluding the black lung is a result of coal mining.

Now, that was changed in 1981 and 1982 by the administration's proposal. So the presumption was removed. I did not agree with that.

Now, granted, coal mining underground and presence in radiation areas, such as Operation Crossroads, two explosions, are different matters. But is there not, after looking at all the information on atomic veterans, a sense of what is the right or wrong thing for the Government to do?

DNA reports to an assistant secretary in the Department of Defense. Department of Defense carried out the atomic tests many years ago. And here you are, General Pickitt, a good man, a true professional, defending the honor of your Nation, but in an awkward position. It would seem to me, by taking into account various reports that show that you cannot conclusively prove the relationship between radiation exposure and illnesses, one must decide what is right to do. It does not seem to be the point at the moment that you cannot conclusively prove the correlation. Because you did not see the snow fall during the night and hit the ground, although you woke up to find snow in the morning, you may not be able to demonstrate that it snowed that night. And take somebody who was in the radiation zone: Mr. Carper from West Virginia says that when he was steering the salvage ship and all of a sudden the Geiger meter started going up, he tried to get out, but he could not steer a ship like we can steer a car, and therefore it took a while to get out of the zone.

Now, I guess you cannot prove the origins of atomic veterans' illnesses scientifically, but is there not a moral question here? The Department of Defense ordered these things to happen, and here it is years and years later, 40 years later, almost, and the Department of Defense, through DNA, is saying, we do not have the proof of this, or we do not feel we have the proof of this. There are people dying, and these are people who were simply answering a call.

We can talk about clean suits, dirty suits, foam, clean ships, whatever. But here were people assigned to duties about which no one knew enough. Radiation was something that nobody understood. The servicemen, though, were doing what they were asked to do.

One fellow, the "Geiger Man," under great stress, would take measurements. And then we get into an argument about National Bureau of Standards saying that in the laboratory tests those film badges go up or down 100 percent in measurement accuracy. Certainly those measurements at Crossroads were not laboratory tests. There was, you know, only one fellow in each situation under a lot of pressure reading a lot of film badges.

I mean, is there not some question of right or wrong? Why is it that DNA finds it necessary to insist on trying to oppose doing more for the veterans by saying there is not enough conclusive information? It seems to me if the Department of Defense were the protector of those who worked for it, that it would want to help.

Let me give you an example. It's about Fred Thompson, who will speak later. His father was informed—I believe this is correct—by a naval commander in a letter dated December 1942, that "The United States Navy gladly accepts the responsibility for the welfare and security of your son." That is from 1942.

Many years later, 41 years later, he gets a letter from the chief of naval operations saying, "It should be reassuring to you that in the vast majority of cases, there is virtually no probability that test participation might cause any adverse health effects."

Now, I know that I have not even asked a question yet, but, I mean, this just strikes me as kind of odd and sad. The Department of Defense, DNA, we as Congressmen have some sort of obligation to people who did not know what they were doing, but performed their duties because they honored their country and were called to serve their country. Many of them have cancer. You argue to me, well, it is no greater than the general public. And I say to that, so what?

A lot of them do have cancer. And is it not the burden of others to prove that their illnesses are not because of exposure to radiation? The position of the Department of Defense seems wrong. Seems to me that they ought to be advocates for the veterans. It ought to be some other department, some other agency, some other Cabinet secretary who says no you cannot provide benefits to the atomic veterans because it costs too much, or you cannot prove it scientifically. But it does not seem to me that you all should be doing that. These are your people. They were your orders, generically. It was the business of war and of preparation for war, therefore, that leads to all of this.

And I do not understand that. I am asking you a moral question of right or wrong. Why do you feel an obligation to dispute? Unless you think that these folks are trying to foist something upon the U.S. Government, which I do not believe they are doing. They have been waiting 40 years.

Please feel free to generally answer my question, General.

General Pickitt. May I comment?

Senator Rockefeller. Of course, sir.

General Pickitt. I would like to clarify my remarks in response to your question when you asked about deaths due to cancer among atomic veterans. My statement bearing on the general public just addresses the full 203,000 atomic veterans. The study that we did assessed a 25-percent sample of those involved; 50,000. The finding of this study was that their death rate due to cancer was about the same as the normal public.

Senator ROCKEFELLER. I understand. I stand corrected.

General PICKITT. But as to your point, let me assure you that while 30 years ago I might not have been as concerned about being a veteran, I have found that as the years pass I am drawing rapidly close to that point. That is not to gain your sympathy, but to give you a feeling of what I see with the people that I am working with in DNA. I am unaware of anyone in DNA that does not—could not sign up to and share with your feelings on the moral issue, Senator. What DNA is trying to do to the best of its ability is assess exactly what happened to each individual. We are trying to do that on an individual basis. We have made, as you are aware, numerous efforts to contact, to identify, to provide telephone numbers that can be called from anywhere. We have even been on "Sixty Minutes." We have gone to all the veterans' associations and veterans' administrations to attempt to get to each individual atomic veteran.

Where the veteran can provide information that will help us make the assessment, then we change his record and take his side of the story. DNA has been assigned the responsibility, both technically and morally, to use their expertise to provide a technical assessment of radiation received by the individuals. It is the responsibility of the Veterans' Administration to decide if each individual radiation dose is medically significant.

What we are trying to do is not bias because we are sympathetic, not bias because we are trying to save anyone money. We are trying to simply provide the baseline of facts upon which medical judgments can be made by those qualified to make medical judgments.

Senator ROCKEFELLER. Does not——

General PICKITT. While morally I share your concern, I think you can probably share my sense of responsibility that we need to have a substantive basis for making medical decisions. And that they should be factually as supportable as possible for our baseline.

Senator ROCKEFELLER. Does not the 40-year factor bother you? I mean, people are dying.

General PICKITT. Yes. It bothers me that people are dying.

Senator ROCKEFELLER. There are not many of these folks left.

General PICKITT. No; I understand.

I know of the ones that are dying. The biggest difference between cancer and black lung is that black lung is factually tied to coal mining while cancer, unfortunately, does not have only one source. It occurs as a result of many factors not associated just with atomic tests.

Senator ROCKEFELLER. And I deeply understand that, General.

The, nevertheless, fact remains, you know, radiation, we are—if you get—I mean, if you go to a doctor's office these days and you go to different doctors or you get different x rays, and doctors love to give x rays, and you get a lot of x rays and you are sort of taught to worry about getting too many x rays. Now, that is radiation of a different sort, and extremely minor.

General PICKITT. The radiation is of the same sort, and the levels are similar, they are both minor.

Senator ROCKEFELLER. Yes; but I mean, it is a very minor thing. I guess I do not see the parallel. I guess the thing that bothers me is after 40 years, if the science has not produced itself, we are going to be very quickly in a situation where we are not going to need the science because the people are not going to be alive anymore. By definition, 40 years plus if you consider the age that each individual volunteered or was drafted for the military, puts the atomic veterans at least at 58 years old. Men die sooner than women. There were more men involved than women, obviously.

So, I mean, at some point, this is going to be very academic, and are we not going to look back with a tremendous amount of regret that we relied so on science? I mean, if there was a period of time for a number of years when our Federal Government, or, in our case, our State laws, were able to say, we presume coal miners have black lung——

Chairman MURKOWSKI. Senator, your 10 minutes has expired, and, of course, this line of questioning is appropriate in a sense, but somewhat redundant inasmuch as it is the whole point of the hearing.

Senator ROCKEFELLER. Well, I appreciate the critique, Mr. Chairman, but if I could have another 2 minutes, I would appreciate that.

Chairman MURKOWSKI. I would remind you we have two further panels, and we want to make sure that they also have an opportunity to be heard.

Go ahead.

Senator ROCKEFELLER. Well, if the chairman would prefer, I will cease my questioning.

Chairman MURKOWSKI. Thank you, Senator Rockefeller.

The Chair has other questions which we will submit for the record to be answered.[1]

Senator Cranston.

Senator CRANSTON. I do have a few more I want to ask verbally now, and—but they are very, very few.

I wanted to try to clarify the date of the picture of the U.S.S. *Hughes* that we discussed earlier. On page 105 of your historical report, it is indicated that the *Hughes* was towed on July 26, not on the 28. That was 1 day after Shot Baker. Does that not then suggest that the *Hughes* was heavily contaminated at the time of that picture?

Mr. BOREN. Sir, on what page?

Senator CRANSTON. At pages 104, 105.

Mr. BOREN. Sir, the *Hughes* was towed several times. I would like to point out that in the back of the report are extracts from the deck logs.

Senator CRANSTON. This just states, during preparation for towing after Crossroads. The paragraph I am referring to begins at the very bottom of page 104 and runs over to page 105.

Mr. BOREN. Sir, if you will look in the back, I believe that is an editorial error, because if you look on the back on page——

Senator CRANSTON. Did you refer to an editorial error?

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[1] See p. 762.

Mr. BOREN. I think it is probably an editorial error, because on page 338 there are extracts from the deck logs. It says quite clearly that July 28 was the day it was beached.

And to resolve this, we can provide the deck log.

Chairman MURKOWSKI. Would you request the deck log?

Mr. BOREN. We will do it.

Senator CRANSTON. Would you provide the deck log for us?

Mr. BOREN. We will certainly do that, sir.[1]

Senator CRANSTON. The DNA's rebuttal on page 80 of the GAO report states that "only 37 of the 72 target vessels caught in the base surge were reboarded for even potential decontamination."

How were the remaining 35 target vessels moved from the lagoon?

Mr. BOREN. I think you are confusing decontamination, which is an exercise that is probably going on in the photos, with towing, which is——

Senator CRANSTON. Well, did not personnel have to board the ships in order to arrange for towing?

Mr. BOREN. Yes, sir, and if you go aboard a ship to tow, it is quite different from decontamination.

Senator CRANSTON. It could still be a ship that is contaminated and therefore presence on that ship can be an exposure?

Mr. BOREN. Yes, sir. But it is a different type of activity, a short term activity, one that is not likely to stir up radioactive fission products, one that before you went on board, you had a monitor check that area. It consists of perhaps 5 people as opposed to 30, or 40, or perhaps 100 people. It is quite different, and we wanted to make that distinction to GAO.

Senator CRANSTON. Yes, but the question, of course, what happened to the five people? Five people are important along with 40 people.

Mr. BOREN. We also do calculations for them, too, sir. We try to individualize each VA claim. Each VA claim addresses each person's participation. If he says he was involved in towing activities, we assume that he is correct and incorporate it in our calculations.

Senator CRANSTON. In his testimony today, Dr. David Bradley speculates about the decision to abandon Operation Crossroads after Shot Baker, and about the information Colonel Warren presented to the operation's leaders that led to that decision.

What information is available today about that decision, if any?

Dr. GILLESPIE. The decision to terminate Operation Crossroads?

Senator CRANSTON. Yes.

Dr. GILLESPIE. I am not sure I understand your question, Senator.

Senator CRANSTON. What led to the decision to terminate? What do we know about that?

Dr. Bradley speculates in his book, which I gather some of you have read, about the decision to abandon Operation Crossroads after Shot Baker, and about the information Colonel Warren presented to the operation's leaders that led to the decision to stop.

Senator CRANSTON. What do we know about that decision?

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[1] Retained in committee files.

Dr. GILLESPIE. Well, I think we know quite a lot about the decision, based primarily upon the evidence of the oral history as well as some other documents from Colonel Warren.

Let me read to you from the memo of August 7 to Admiral Blandy, signed by Stafford Warren. After a long discussion of the situation that prevails at the time, and his expectations for what situation will prevail in the future, his recommendation is, "It is recommended that the present operations in the Bikini Lagoon be terminated on 15 August 1946, since there is neither equipment nor adequate monitoring personnel available to continue safely operations beyond this date."

[The following information was subsequently supplied for the record:]

This recommendation was accepted. All decontamination operations at BIKINI were halted on August 10, and the entire operation began to be shut down.

Chairman MURKOWSKI. Senator Cranston we have kept veterans waiting over 2½ hours, and I am wondering if you would agree that we could call up witnesses after the two remaining panels which we have.

Senator CRANSTON. Yes, if these people will wait. I do have a few more questions for them, and I think the veterans would like these questions to be asked of them.

Chairman MURKOWSKI. We would also encourage the members to submit questions for the record, and obviously the staff can examine the record and get the appropriate answers. I feel we do have an obligation, and we also have a concern of sitting after noon. I assume there is not going to be an objection.

General PICKITT. We would be pleased to wait, sir.

Chairman MURKOWSKI. Thank you very much. I appreciate you accommodating me, Senator Cranston.

Senator CRANSTON. Thank you.

Chairman MURKOWSKI. Panel No. 3 would be Dr. David Bradley, from Hanover, NH; and Dr. Robert A. Conard—that is Setauket, NY?

Dr. CONARD. Setauket, NY, yes.

Senator CRANSTON. Mr. Chairman, I would like to say one word of welcome to David Bradley.

Chairman MURKOWSKI. Proceed.

Senator CRANSTON. David Bradley and I met in 1946 or 1947 shortly after Bikini and Hiroshima and Nagasaki. Dr. Bradley will say some very interesting things that he said to me, some of them "way back when," about the effects of radiation and the dawn of the nuclear age. And ever since, he and I have been concerned in many, many respects about the nuclear weapons that are on the loose in the world and the testing of those weapons and the effect of that on human beings.

And I am delighted that we come together once again, David, upon this occasion in our respective roles.

Dr. BRADLEY. Thank you, Alan.

Chairman MURKOWSKI. Thank you, Senator Cranston.

Please proceed, gentlemen, as you see best.

STATEMENT OF DR. DAVID BRADLEY, HANOVER, NH

Dr. **Bradley**. Mr. Chairman and members of the committee, I am grateful to you for inviting me down so I can thaw out here in your beautiful city.

I think it must be perfectly clear to this committee that you are not going to get any science any more than you have, and it is not going to be very good science whatever you get.

Operation Crossroads—I have submitted some material for you there, and I will get to it in a moment—but Operation Crossroads was a military operation, not a scientific experiment, and went through all the unexpected problem that you expect in a military thing, all the sudden makeshift things you had to do, the lack of good equipment, the terrible instruments you had, the unreliability of film badges, all that sort of stuff and much more, so that I think you are not going to get a reliable estimate of anybody's dose under any circumstance.

Chairman **Murkowski**. Could you pull the microphone a little closer, Doctor?

Dr. **Bradley**. Sure.

I will say that I was one of Stafford Warren's geiger men, trained for 5 months by him and by Dr. Karl Morgan. Those were two great men, and I trusted my life to them, and I think you can trust what they have written.

I am not going to read any of my written testimony because there are other people who want to speak. What I am really trying to say here is I had a whole variety of experiences at Crossroads as a young and ambitious radiological monitor. I have given you books, copies of the book that I wrote.

Chairman **Murkowski**. We have your book, "No Place to Hide."

Dr. **Bradley**. Right. And that knows about all I know.

But I did prepare for you a kind of an index, so if you want to look something up, you can in a hurry. And then after reading the General Accounting Office material, I prepared for you a further statement. Do you have that, Mr. Chairman? Eight different reasons for not putting much trust in dose reconstruction.

You have that, have you?

Chairman **Murkowski**. Yes, we do.

Those will be entered into the record as if read, and will be a permanent part of the record.[1]

Dr. **Bradley**. Thank you.

I certainly feel different from the people who have been—who spoke here just a moment ago. I do not consider that we had any really satisfactory safety measures. For example, you raised the question of clothing. I never saw protective clothing, and I was a radiological monitor, until about 3 weeks after Test Baker, when we got the ships down in Kwajalein harbor and were lugging out ammunition. At Bikini we ran around there in shorts and skivvies and a baseball hat and tennis shoes; that is what we had, and that was what everybody used, as far as I can remember, on the *Haven*.

Now, as for personal contamination, goodness, half the time there after Baker the evaporators were not working very well. We could take a shower about once every 2 or 3 days. But we accepted that. This was a military operation, and you do not expect to be able to go and jump into a nice bath and clean up. We did the best we could. That is all I can say we did.

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[1] See p. 489.

Let me draw your attention to the aircraft I was in. Immediately after the test shots, my buddy and I were to fly in over the lagoon at 2,000 feet, 1,000 feet, and 500 feet, making a series of patterns. And I had six instruments I was supposed to read, and I would radio what those instruments said back to the control ship, and they could then decide what to do. It is all written in the book there.

After Baker, my buddy was in a plane just ahead of me, and when he came in at 2,000 feet he ran into some radiation and radioed to us to go up to 3,000, because there was a lot of hot stuff coming up from the water. And we went up to 3,000. When we got back down to 2,000—I do not remember these dosages—when we got back down to 2,000 feet, he was at 1,000 feet, and he radioed to the control ship, we are getting out—I think it was Leg 4—abandoning Leg 4 and waiting for instructions.

That can only mean that at that level at that time he was running into radiation back and forth across the target area of somewhere between 30 and 50 roentgens, and he did not want to continue the survey. After a while we received instructions to proceed no further but to return to base.

Now, that would mean that at the water level—you have to multiply by about 50 or 60 from where he was—if he was in 50 roentgens per hour up there, on the water it would have been something like 2,500 roentgens. This was not an operation that produced a very small amount of radiation.

I have a report of one film badge I have been able to run down from that Baker day. What do you suppose, after us running into all sorts of radiation up there, what do you suppose that film badge said, Mr. Chairman?

Chairman MURKOWSKI. I have no idea.

Dr. BRADLEY. You are right. It did not, either. Zero. I do not know what the film badge was made of, tar paper or something like that. Anyway, that is what it is reported to read.

Chairman MURKOWSKI. Do you have any idea how many rems you felt you might have been exposed to?

Dr. BRADLEY. On that particular day? I have often wondered about that.

Chairman MURKOWSKI. Or throughout the entire operation, for that matter?

Dr. BRADLEY. Oh, I have asked the gentlemen back here to find it out for me, and it has been a long time.

Chairman MURKOWSKI. Your health is pretty good?

Dr. BRADLEY. My health is pretty good.

I would like to say one more thing, though. To show you how thin that safety operation was. When all the big shots went back home about the 15th of August, Colonel Warren and some others called me in and said, Bradley, you are in charge of the laboratory, that is, water-counting laboratory, ship survey laboratory, and urinalysis for 3,000 buckets of urine. You are in charge of the laboratory.

And I said—because orders are orders—Colonel, can I have a book giving some guidelines or some standards or something like that to go by so I will know what I am doing?

You know what they said? You cannot have it. You cannot have it.

And I said, why not? I've got to. How can I operate?

They said, it is secret. It is classified. W cannot leave that information out here. Do the best you can.

That is not much of a safety operation. I thought you'd like to see the notebook I had, my notes; that was the sum total of the library for our laboratory after I was put in charge. My notes from the lectures that was the library. That is how good, how scientific we were.

Chairman **Murkowski**. Did you ever have occasion to make an inquiry later to see if whatever was classified was meaningful?

Dr. **Bradley**. I cannot believe it is classified.

Chairman **Murkowski**. Well, assuming it was?

Dr. **Bradley**. I did not.

Chairman **Murkowski**. OK.

Dr. **Bradley**. It seems utterly incredible.

Chairman **Murkowski**. Well, I cannot do anything but agree with you, but please proceed.

Dr. **Bradley**. If you look at what actually happened somewhere between August 1 and August 10, this big naval operation was shut down completely by an Army colonel, believe it or not, by an Army medical colonel, too, that has never happened in military history, has it? But that could not have been the case. It was not Colonel Warren who shut the task force down; it must have been the radiation. And I say this committee ought to just subpoena all the documents that Colonel Warren laid out before Admiral Blandy and the Joint Chiefs, saying here is what you see on all these ships, here are the records of all the dosimeters and here are the records of all the film badges and here are the records of all those Geiger counters; that is what we are dealing with.

You cannot conceive of this great operation stopping because of "low level" radiation. I cannot conceive it. Maybe somebody else can.

Now, as for dose reconstruction, I have given you all the reasons I think there is not much science there, not much. The worst was the urine tests. But anyway, I think dose reconstruction is a complete fantasy. Sounds scientific, but there is not any substance underneath it. When used as a basis for judging an individual veterans' claim, the method can only be dishonest.

This is where the chickens come home to roost. The DOE, and AEC before them, has said for years to every veteran, that there is not one case of proven connection between radiation and cancer. Not one has ever been proven.

That is true, you cannot prove it in any one case. You cannot prove it. It has got to be a statistical proof. You cannot prove a single case. Exactly as it is with cigarettes and lung cancer.

But here I claim that the Government cannot—in not one individual case can the Government prove that their reconstructed dose is accurate. And if you cannot prove it for one individual, you might as well call it off as a policy. The VA doctors have to work with individuals, not averages. I think it is a shameful policy, does a gross injustice to our veterans, and, I think, has no scientific basis.

Mr. Chairman I feel so strongly about this, I—I guess I will not say any more. I will answer questions.

[The prepared statement of Dr. Bradley follows:]

PREPARED STATEMENT OF DR. DAVID BRADLEY

My name is David Bradley, retired surgeon, and Emeritus teacher at Dartmouth College. In 1946 I was one of Col. Warren's "Geiger Men," the first doctors in military history to have to deal with radioactivity under field conditions. Fortunately we had received months of training from such men as Col. Stafford Warren and Dr. Karl Z. Morgan - great men, both of them, careful doctors and farseeing scientists. I had to trust my life to them; I think you can trust their words.

My primary job at Bikini, in both tests, was to fly in over the target fleet at 2000, 1000, and 500ft, taking measurements of radiation coming up from the ships and the water or in the air. These measurements we radioed to the control ship.

After that I had a variety of ship, water, island, seabottom, fish and laboratory assignments. Being a young Army Lieutenant assigned to the Navy, I naturally thought I got all the "worst" assignments - i.e. the very best from the point of view of getting to know A-bombs close up.

It was kind of you to let me come and testify. I could see little point in paraphrasing what I'd already written in a little book No Place To Hide, first published in 1948, so I've sent you all copies of the recent edition. It gives a kind of setting and narrative against which to place the details of the Warren papers.

I've also prepared for you a kind of index of events and radiologic topics, should you wish to investigate further.

One caveat: Not one of us is a true expert here. Not Col. Warren, not Adm. Blandy, nor the Joint Chiefs, not I, not even the cool young soothsayers from the DOE.

All we can tell you is an imperfect and partial story. But that story itself is so astounding that it can be read without the help of experts:

Like the one-bomb-one-city phenomena in Japan, here is a great American naval task force, proud, sleek, beautiful, suddenly brought to a stop, run aground, dead, and ultimately sunk by -- by the leftover pieces of one tiny inefficient plutonium bomb.

It wasn't blast; it wasn't fire that killed that task force, as of course you all know. It was radiation, radiation effective beyond all expectation. On or about the 16th day post-Baker the decision had to be made to abandon the ships and the tests.

Why? (I would have you focus on that moment.) Admiral Blandy, Admiral Solberg, Admiral Parsons, General Stilwell etc., were tough intelligent military leaders not easily spooked. Not likely to be panicked by the data, the numbers Col. Stafford Warren had assembled for them from geiger and film badge readings all over the target area. From the gangways, from the evaporators, from food, clothes, shoes, from the hot spots on deck, from the air in the mess rooms and corridors, from the beaches, water, fish, from everywhere sailors and soldiers and scientists went.

The numbers must have been horrendous. (You didn't need a medical man to read those numbers.) So horrendous, in fact, that I think we've been trying ever since to hide them from the veterans and from ourselves.

References to events and dangers at Operation Crossroads as reported in No Place To Hide (1948)

Prepared for Senate Committee on
Veterans Affairs
December 2, 1985

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David Bradley

David Bradley, M.D.
Member of Radiological
Safety Section 1946

ADDENDUM - David Bradley's testimony

Re: Dose Reconstruction

Let me list for you some of the weaknesses of, and gaping holes in, the radiologic measurements of even our most conscientious medical men at Bikini:

1. Radiologic Monitors far too few well-trained monitors.
2. Film Badges, after first test only enough for monitors and Chiefs.
3. Instruments:
    - a) Victoreen 263 (GM. counter) - experimental, very delicate, easily knocked out, measured only very low range.
    - b) "Green Monster" 247 (ionization chamber) Excellent Reads 0-2, 0-20, 0-200, we had only a few.
    - c) Alpha Counter - useless.
    - d) Lauritsen Electroscope - Excellent.
4. Radiation varied greatly. Even on the same deck it might got from 0 to 20, 50, 150r.
5. No accurate measure of Beta particles.
   No measurement of Alpha particles (mainly plutonium).
   No measurement of air contamination.
6. Blood Tests, meaningless
   Urine Tests, meaningless or worse
7. No follow-ups or medical check ups.
8. Records consistently withheld from veterans, or lost, or burned in St. Louis, so that correcting factual inaccuracies is impossible.

In summary, Dose Reconstruction is almost pure fantasy. It sounds scientific but there is little substance underneath.

When used as a basis for judging individual veteran's claims, the method can only be dishonest. In not one individual case can the Government prove their reconstructed average to be accurate.

David Bradley

Chairman **Murkowski**. It has been called to our attention, Dr. Bradley, that an article by Dr. Stafford Warren, who is the dean of medical school, University of California—you may be familiar with Dr. Warren.

Dr. **Bradley**. He was my boss, my best friend.

Chairman **Murkowski**. You have talked about him.

And in this article, there is a statement that—and I will just briefly refer to it:

> Three hundred men of the safety section lived and worked in a heavily contaminated area to protect some 42,000 other members of the Bikini expedition. Every group which entered the target area was accompanied by a safety monitor who determined how long he could stay. When a group returned, the men bathed carefully and were tested with Geiger counters. If the counter indicated radioactive contamination, the men were sent back to bathe again. Occasionally, when a man had taken off his protective gloves in a "hot" area, the safety section had to dissolve the outer layer of skin from his hands with acid, etc. Clothes that were worn in the target area were often measured with Geiger counters and found too contaminated to clean. Hundreds of pairs of shoes and gloves, other clothing, were sunk a mile in the ocean because there was no other way to keep them from permanently—away from human beings.

I am just wondering if you agree with that statement.

Dr. **Bradley**. I am not clear, sir, who wrote that. Did Dr. Warren write that?

Chairman **Murkowski**. That is what it says. It is a Life magazine article in 1946. We would be happy to provide it for you, and I would appreciate your comments on it.

Dr. **Bradley**. Can I take it home and write?

Chairman **Murkowski**. Certainly, the record will remain open.[1]

Dr. **Bradley**. I was only a flunkie out there going from one job to another, and I do not think I saw the most heavily exposed—the people in most danger. Those were the boarding parties who rushed in to retrieve instruments and animals; or parties who had to pump the ships out, had to go down into the engine rooms with water sloshing around, probably contaminated water, and get the motors going, the blowers going, and the engines going; or the people who were going aboard to try to decontaminate the ships, wash them down. I had only a couple of those missions.

So I do not think I saw anything like the most serious contaminations.

Chairman **Murkowski**. Dr. Conard?

I am going to be leaving the hearing, and I believe Senator Cranston has agreed to proceed with the hearing process. So please go ahead, Dr. Conard.

I thank you, Senator.

Senator **Cranston**. Yes.

Chairman Murkowski. We have Senator Warner, who has also joined us.

Senator **Warner**. Thank you. Please proceed.

STATEMENT OF DR. ROBERT A. CONARD, SETAUKET, NY

Dr. **Conard**. Well, my participation in Crossroads operations was quite different from David's. I would like to share with you some of the recollections of the radiological safety operations from my point of view.

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[1] Retained in committee files.

During the war, I was a medical officer aboard a cruiser in the Pacific, and after return later on, I was on duty at the Naval Medical Center when I was asked if I would like to join Operation Crossroads as a radiological safety officer. I agreed, and thus began a lifelong career in the field of radiation effects.

Following Crossroads, I have participated as a rad-safe officer at Operation Greenhouse, at Eniwetak, and on several Nevada tests. Later, at the Naval Medical Research Institute, I carried out research studies on the effects of radiation on animals.

In March 1954, the unfortunate accidental fallout exposure of 240 Marshallese and 28 American servicemen occurred in the Marshall Islands following a detonation of a large thermonuclear device at Bikini. I was a member of the medical team involved in the examination and care of these people. I then went to Brookhaven National Laboratory after leaving the Navy where, for 25 years, until my retirement 6 years ago, I headed up the continuing medical care of the Marshallese people.

In preparation for Operation Crossroads, I was sent along with a group of medical officers, about a dozen, as I remember, to various national laboratories for intensive indoctrination in radiological safety procedures in the 4 to 5 months prior to the operation. At Los Alamos, Chicago, Oak Ridge, and the University of Rochester, we were given intensive training in radiological safety procedures, including instrumentation, measurement, protection, and decontamination.

Those of us involved in this training program were later to become key men in the operation, supervising those with less training.

At Bikini, we, in the rad-safe section, were under the able direction of Drs. Stafford Warren and George Lyon. Both were highly regarded in the field of radiology and radiological safety. Dr. Warren had been with the Manhattan District. They were ably assisted by Drs. Robert Newell, Wright Langham, and others. They ran a tight ship, and admonished all of us to make every effort to keep radiation exposures as low as possible. The task force command gave high priority to the rad-safe program.

At Test Able, I was senior monitor on one of the patrol boats, the first to enter the lagoon and clear the sectors for target ship boarding. This operation went smoothly with no great radiation problems that I remember. By the end of the day we were able to clear the ships for boarding parties.

The Baker test caused a much more serious radiation situation due to the contamination of target ships with water mixed with fission products. My assignment was rad-safe representative on the U.S.S. *Kenneth Whiting,* the technical director's ship, which was involved with recovery of scientific instruments from the target vessels. The working parties boarding these ships were exposed to greater radiation hazard than other personnel.

I established a strict set of written rules for the ship which was approved by rad-safe administration. These involved issuance of film badges, protective clothing, careful recording of personnel movements and doses, establishment of a change station, and checking every man and his clothing on their return to the ship. Cooperation with these procedures was excellent.

Colonel Warren told me later he was pleased with the way we handled the situation on our ship.

Though I cannot remember the precise doses of personnel boarding target ships, I do not recall many cases of overexposure. Monitors accompanying the boarding parties reported estimated doses received by their men during their working days with their instruments they had on board. Those doses did not appear to be out of line with film badge doses.

I had the opportunity yesterday to review the film badge readings of 397 people based on the *Kenneth Whiting;* 90 percent were less than one-tenth rem, and only about 1 percent were greater than two-tenths rem. These are very low doses, and in the range received by all of us year in and year out from natural exposure to radiation, including medical radiation.

Later in the operation, I was put in charge of the rad-safe laboratory at Kwajalein. We were responsible for the radiological safety of the crews boarding the target ships returning to Kwajalein. The most difficult responsibility concerned the removal of ammunition from the ships. Due to the uncertainty about internal absorption of radioactive materials, we required the men to wear respirators during the operation on the ship. The safety procedures at Kwajalein were well adhered to, and I do not recall any overexposures.

Crossroads was an operation great in scope and number of participants. There had been no previous radiation experience with operations of this type. It is not surprising that unexpected radiation hazards developed. However, I was impressed with how well the rad-safe administration kept abreast of the radiation situation, acting promptly to prevent overexposure of personnel when hazardous situations developed.

In spite of the problems faced by the rad-safe section, I think they functioned well. The scarcity of individuals exceeding the permissible level attest to this.

Now, as a postscript, I have written several points with regard to the Marshallese contamination with which I was involved for so many years, and as it might pertain to the Crossroads exposures. These have to do with irradiation of the skin, beta contamination of the skin, the internal absorption of radiation, alpha contamination, and possible genetic effects in the offspring of people. I do not know whether the Chair wants me to—this could be in the record, or if you wish, I can take another 3 minutes.

Senator **Cranston**. Just submit them for the record, please.

Dr. **Conard**. So that would complete my testimony, then.

[The prepared statement of Dr. Conard follows:]

PREPARED STATEMENT OF
REAR ADMIRAL ROBERT A. CONARD, MC, USNR (RETIRED)

My name is Robert Conard. As an atomic veteran and one who actively participated in Operation CROSSROADS I would like to share with you some of my recollections of the radiological safety of the operation.

During the war I was medical officer aboard a Cruiser in the Pacific. After my return, later on, I was on duty at the Naval Medical Center in Bethesda and was asked by the Navy to participate as a radiological safety officer at Operation CROSSROADS. I agreed and thus began for me a life-long career in the field of radiation effects. Following CROSSROADS I participated as a Rad-Safe officer at Operation GREENHOUSE at Eniwetak and on several Nevada tests. Later, at the Naval Medical Research Institute I carried out research studies on the effects of radiation in animals. On March 1, 1954, the unfortunate accidental fallout exposure of 240 Marshallese and 28 American servicemen occurred in the Marshall Islands following detonation of a large thermonuclear device at Bikini. I was a member of the medical team involved in the examination and care of these people. I then went to Brookhaven National Laboratory after leaving the Navy where for twenty-five years, until my retirement six years ago, I headed up the continuing medical care of the Marshallese people.

In preparation for CROSSROADS Operation I was sent, along with a group of medical officers, to various National Laboratories for intensive indoctrination in radiological safety procedures for four to five months. At Los Alamos, Chicago, Oak Ridge and University of Rochester we were given intensive training in radiological safety procedures including instrumentation, measurement, protection and decontamination. Those of us involved in this training program were later to become key men in the operation, supervising those with less training.

At Bikini we in the Rad-Safe section were under the able direction of Drs. Stafford Warren and George Lyon. Both were highly regarded in the field of radiology and radiological safety. Dr. Warren had been with the Manhattan District. They were ably assisted by Drs. Robert Newell, Wright Langham and others. They ran a "tight ship" and admonished all of us to make every effort to keep radiation exposures as low as possible. The Task Force Command gave high priority to the Rad-Safe program.

At Test Able, I was senior monitor on one of the patrol boats, the first to enter the lagoon and clear my sector for target ship boarding. The operation went smoothly with no great radiation problems that I remember and by the end of the day we were able to clear ships for the boarding parties.

The BAKER test caused a much more serious radiation situation due to the contamination of the target ships with water mixed with fission products. My assignment was Rad-Safe representative on the USS

KENNETH WHITING (AV-14), the Technical Director's ship which was involved with recovery of scientific instruments from the target vessels. The working parties boarding these ships were exposed to a greater radiation hazard than other personnel. I established a strict set of written rules for the ships which was approved by Rad-Safe Administration. These involved issuance of film badges, protective clothing, careful recordings of personnel movements and doses, establishment of a change station and checking every man and his clothing on return to the ship. Cooperation with these procedures was excellent. Colonel Warren told me he was pleased with the way we handled the situation on our ship.

Though I cannot remember precise doses of personnel boarding target ships I do not recall many cases of overexposure. Monitors accompanying the boarding parties reported estimated doses received by men during their work day. Those doses did not appear to be out of line with the film badge doses. I had the opportunity yesterday to review the film badge readings of 397 of these people based on the KENNETH WHITING. Ninety percent were less than .1 rem and only about one percent were greater than .2 rem. These are very low doses and are in the range received by all of us, year in and year out, from natural and medical radiation.

Later in the operation, I was put in charge the Rad-Safe Laboratory at Kwajalein. We were responsible for radiological safety of crews boarding target ships returning to Kwajalein. The most difficult responsibility concerned removal of ammunition from the ships. Due to the uncertainty about internal absorption of radioactive material, we required men to wear respirators during the operation on the ship. The safety procedures at Kwajalein were well adhered to and I do not recall any overexposures.

CROSSROADS was an operation great in scope and number of participants. There had been no previous radiation experience with operations of this type. It is not surprising that unexpected radiation hazards developed. However, I was impressed with how well the Rad-Safe administration kept abreast of the radiation situation, acting promptly to prevent overexposure of personnel when hazardous situations developed. In spite of the problems faced by the Rad-Safe section, I think they functioned well. The scarcity of individuals exceeding the permissible level attests to this.

As a post-script I would like to comment on several aspects of the fallout effects on the Marshallese exposed to fallout which have a bearing on exposures of CROSSRAODS personnel.

First, with regard to radiation of the skin. The Marshallese had heavy contamination of the skin which resulted in development of so called "beta burns" in three fourths of the Rongelap people within a few weeks of exposure. However, the burns healed rapidly and after more than 30 years there is no evidence of cancer of the skin. In fact I do not know of a case of cancer of the skin resulting from beta radiation. At CROSSROADS, I examined many men for skin contamination and I do not recall any excessive exposures and no evidence of "beta burns" were noted. So it seems extremely unlikely that any skin cancers would result.

My second reference is to internal absorption of radiactive materials. Internal absorption of fallout in the Marshallese was readily evident from radiochemical urine analyses. Absorption was largely from ingestion of contaminated food and water with much less absorption from inhalation. This may have been partly due to the fact that the particle size of fallout was generally too large to get into the lungs. Animals removed from the island, who had been exposed showed most of the radioactivity in the gut with little in the lungs. Radioiodine, which later resulted in thyroid tumors in the Marshallese, was the only radioelement to exceed the permissible level. No other late effects have been noted from absorption of other radionuclides. It seems probable that the internal absorption of radionuclides in CROSSROADS personnel would have been for less than in the heavily exposed Marshallese since (a) there was little or no fallout from Test Able; (b) after Baker inhalation of radioactive particles would have been minimized due to washing down of the ships prior to boarding, the water tending to scrub out radioiodine and remove loose material from the decks; (c) the principal sources of internal absorption would have been from ingestion, but since food and water were protected this source of absorption must have been negligible.

A few words about internal absorption of plutonium. The Marshallese were exposed to a much greater hazard from this source than CROSSROAD personnel. I just received word that on the basis of sensitive urine tests recently developed at Brookhaven National Laboratory the Marshallese people had only absorbed plutonium in amounts that were 1/100 to 1/200 of the maximum permissible body burden and that based on 50 years of exposure the dose to the bone would have been very low. As an atomic veteran this is very reassuring to me.

With regard to genetic effects we have not detected any increase in abnormalities in children of exposed Marshallese parents. Of greater importance are the results of studies of thousands of Japanese children whose parents received hundred of rads of radiation. Some of the best geneticists in the world have studied these children and have found no increase in abnormalities that could be attributed to radiation exposure of the parents. Therefore it seems extremely unlikely that genetic abnormalities from radiation exposure would be detected in children of CROSSROADS personnel.

Senator **Cranston**. Thank you very, very much for testimony from both of you.

David, I just want to express my admiration for the intelligence and the emotional commitment and the persistence that you have applied to this matter ever since we encountered each other some 39 years in relationship to all these matters.

Dr. **Bradley**. Alan, it is catching from people like you who refuse to give up, either.

Senator **Cranston**. Thank you.

Knowing what you know now, would you have wanted to go on those ships without protective clothing?

Dr. **Bradley**. My only experience with protective clothing was that it made the job almost unworkable, and I think I would have taken the chance without. To be covered with coveralls and a gas mask and boots and mittens and be lugging stuff out, as I had to, 50 pounds of TNT at a time, I think it was—out of the *Independence*, I could only work for a couple of hours, and I was practically dead. It was just terrible environment. Maybe others have had better experience, but I would take my chances without it.

Senator **Cranston**. How aware were you then of the radiation dangers?

Dr. **Bradley**. I think I agree with Dr. Conard: very aware. Dr. Warren was a very farsighted person. He anticipated a whole lot of things, and he had us ready for it, just as he said. He had us ready for it. And I was completely aware.

For example, all those dog experiments and rats and mice experiments which he helped to get started that told us so much about internal radiation, you know. I remember him taking a thing like this——.

[Witness demonstrating with grains of sugar.]

Dr. **Bradley** [continuing]. And saying, if any of those things were plutonium in your lungs or in your bones, you would probably be dead. Not next week, not next month, not next year. It does not take very much plutonium stuck in you to kill you, at least in rat and dog experiments. We have not, I guess, openly experimented on humans yet, although at Bikini you certainly had a big laboratory, and a lot of people exposed to plutonium. So it will show up, the effects of it, no question.

Dr. **Conard**. Could I comment on that?

Senator **Cranston**. Yes, of course, Dr. Conard.

Dr. **Conard**. In the Marshallese people, they were exposed to a considerably greater hazard from plutonium absorption than occurred with the Crossroads situation. And just recently, they have perfected very sensitive tests at Brookhaven National Laboratory for determination of body burdens of plutonium. And it was very reassuring to me to hear just a couple of days ago that all the Marshallese people that had been examined for this purpose showed levels of plutonium in their bodies over a 50-year period which were only one one-hundredth or one two-hundredth of the maximum permissible body burden. So as an atomic veteran myself, having been involved in many of these tests, this is very reassuring to me.

Senator **Cranston**. When were those readings taken?

Dr. **Conard**. These readings have been taken over the past few years, and they have been recently perfected to great sensitivity. This is something I think that could be done for some of the atomic veterans who might have any question about this. It just takes a small sample of urine, and they can determine the amount of plutonium in an individual.

Senator **Cranston**. Well, obviously, the readings you are referring to were taken of those alive rather recently. Readings are not now available on those who have died for one reason or another.

Dr. **Conard**. Well, you see, the plutonium stays in the body for years and years, and is very slowly leached out.

Senator **Cranston**. Yes.

Dr. **Conard**. So that even at a late date like this, you can extrapolate back.

Senator **Cranston**. Well, if some have died, they may have died for that reason, or that cause; right?

Dr. **Conard**. Beg pardon?

Senator **Cranston**. If some have died, their exposure may have had something to do with their deaths?

Dr. **Conard**. In the Marshallese?

Senator **Cranston**. Yes.

Dr. **Conard**. We have had quite a number of deaths, of course, in a population over 30 years, but actually, only about two cases of cancer have occurred of the type that have been found in Japan to be related to radiation exposure. We have had a number of thyroid abnormalities from radioiodine overexposure from the fallout material, including cancers, in a third of the people. But none of them died from this. We were able to successfully treat them. No deaths have occurred that were related to plutonium absorption.

Senator **Cranston**. Thank you.

David, the DNA in its comments on the draft GAO report stated that "documentation exists which shows that contamination of open wounds was not a problem at Crossroads."

And in support of that statement, they cite your book, "No Place to Hide," and your discussion of a medical emergency on August 24 involving a sailor who cut his thumb on a cable. In discussing that case, was it your position that that was, as DNA indicates, the first case of an injury that could have been contaminated?

Dr. **Bradley**. Of course not. That was the only one I had to monitor, and the only deep wound I saw from a very oily and contaminated cable, and that fellow had been sent over to the hospital ship by a monitor.

But if you are saying, Senator Cranston, that 30,000 young men of 18 to 22 years of age, nobody got any scrapes or barnacle cuts or coral cuts or teeth pulled out or bloody noses or any of those things, nothing happened, just one cut in 30,000 men in 3 months, you cannot—I cannot believe that kind of fantasy.

Senator **Cranston**. Well, I found that statement rather startling in view of the number of times I manage to scrape or cut myself.

Dr. **Bradley**. Those people do not have any children, I guess.

Senator **Cranston**. But the statement from General Pickitt was, well, under those circumstances they would get infected, and nobody came in to report——

Dr. **Bradley**. Every ship had its ship doctor and its——

Senator **Cranston** [continuing]. How would you comment on that?

I beg pardon?

Dr. **Bradley**. Every ship had its ship doctor and a medical corpsman and you go in and get the thing scrubbed up or get some soap and clean it up and it did not get infected.

Senator **Cranston**. Well, apparently there are no records—no entries in the medical records to that effect.

Dr. **Bradley**. No. I would not have thought it necessary. I would have washed it off and put some peroxide or merthiolate on it and let it go.

Senator **Cranston**. Dr. Conard, would you have any comment on that?

Dr. **Conard**. Well, I think that the monitors were aware of the potential danger of wounds from the point of view of contamination with plutonium, and I think that all of them being aware of this, would have restricted one from going on the ship if they had a very bad wound of any kind.

Senator **Cranston**. Would you agree that the doctors would not probably have entered into the record minor treatment of scrapes or cuts?

Dr. **Conard**. I think that what would have been done would be that the wound would have been cleaned, as David said, and if it was necessary for them to go back on the target ship, the wound would be covered, so that there would not be any chance of any internal contamination.

Senator **Cranston**. Would there have been, likely to have been a medical entry in the records in regard to such an incident?

Dr. **Conard**. I really do not know whether the medical record would have included that.

Senator **Cranston**. What were the men told regarding procedures for treatment of contaminated cuts or wounds if they got any?

Dr. **Conard**. Beg pardon?

Senator **Cranston**. Do you know what warnings or instructions were given to the personnel regarding what to do if they got a cut or a wound or a scrape?

Dr. **Conard**. Well, I am not sure whether there were written instructions on that score, but I know that I examined every man returning from the target ships. I examined his skin, went over their bodies carefully with a Geiger counter. We removed their clothing, they showered and scrubbed. If they had skin contamination we rechecked them.

If I had seen any serious wounds of the skin, I would have taken care of the situation.

Senator **Cranston**. Dr. Bradley in his book indicates that there was a policy that if there was—or, a warning that if there was a serious wound or cut or whatever that there would be the probability of an amputation. Were such warnings given to people there?

Do you know, David?

Dr. **Bradley**. Oh, I am referring to a policy I had heard of in the Manhattan District, that that would be a policy, let us say, at Oak Ridge or Hanford. If you got plutonium in you, you had to consider amputation.

I do not think, apart from myself out there, it was considered at Bikini. And that, you see, was so disturbing, I was left in charge of such decisions without any kind of documents to work with. I had to use my own brain. Do I cut this sailor's arm off or do I not? Well, I decided not to.

Senator **Cranston**. You are not saying there was any such policy at Operation Crossroads?

Dr. **Bradley**. Not at Operation Crossroads. I refer to that as something I learned at Oak Ridge—and the DNA mentions that policy in Oak Ridge, I think, itself in that GAO report. I read it there somewhere.

Senator **Cranston**. Dr. Conard described in great detail the safety precautions he went through, which seemed to vary greatly from those you went through, David. How do you explain that?

Dr. **Bradley**. I do not know why. I do not know why. I do not remember anybody, except when I came back from Ebeye, seeing guys going along with Geiger counters along the saltwater lines and the evaporator lines. Those fellows had costumes on, those heavy, heavy protective clothings. I never saw anybody else in protective clothing till about 3 or 4 weeks after Baker.

Senator **Cranston**. I have more questions, but my 10 minutes have expired, so Jay, do you have some?

Senator **Rockefeller**. I do not have any questions. I just associate myself with what these two distinguished doctors have said, and I guess, particularly, with the opening statement that you made, Dr. Bradley. Here we are, 40 years later, looking for more science. The Government seems to be resolving the issues without going as far as the Simon bill, which I support. Congress so far is not acting until there is conclusive scientific evidence, for fear of ripple effects, for fear that it will mean doing the same for some other group. So therefore we are going to wait, you suggest, for a science which will never appear——

Dr. **Bradley**. It never will.

Senator **Rockefeller** [continuing]. Which, in a sense—you correct if I misquoted you—but if that were the case, then we simply will run the clock out, people will finish their dying and the business will be over. And the Government will be said to have not spent a certain amount of money, or perhaps some will say that they did not do it because it could not be proven, like the scientific proof that deaths resulted from exposure to radiation.

But I associate myself with your statement. We are going to spend a trillion dollars on Star Wars if we go through with it. But we do not seem to able to find the proper science for determining if this Government owes people whom they sent into difficult situations without full knowledge of the consequences. We have not decided whether we owe them some justice. And you say there probably is not going to be enough science, to decide on that basis?

Dr. **Bradley**. Absolutely. You will never get it. The material is not there for science.

Senator **Rockefeller**. That strikes me as Government acting in a way which is not what our form of Government is meant to be about.

Dr. **Bradley**. Can I comment on what you say, sir?

Senator **Rockefeller**. Of course.

Dr. **Bradley**. There has only been about 500 Crossroads people who have put in claims. That is a little over 1 percent of the people there; is that not right? Where comes this crazy notion everybody is going to come pouring in demanding this and that? Our veterans are not like that. These people are proud people, and they are very patriotic people. And for the most part they do not want anything from the Government. And only about 3 or 4 percent are going to get ill with radiation, presumptively radiation disease. It is only about 3 or 4 percent, something like that. And we ought to take care of them.

Exactly as you say, we have an obligation; we ought to take care of them. It is a small number. We take care of the Japanese aboard the *Lucky Dragon*, at about $87,000 apiece. We have taken care of the Bikini people. We are going to take care of the downwinders, something like $237,000 per person, if that judgment holds up.

Why is it that the atomic people, the atomic veterans, have to prove to the Government that they were injured by radiation? No other veteran has to do this. No other veteran. Why this case?

A person with multiple sclerosis, who comes down with multiple sclerosis—this has no connection with radiation or anything anybody knows about; we do not know where it comes from—but if it happens within 7 years after their discharge, they can get a service-connected pension. Multiple sclerosis.

But a veteran comes in 8 years after discharge with leukemia, no way. There is not any connection that we can prove in your case between leukemia and radiation. So, sorry, boys, but we cannot take care of you.

I do not understand these things. And I am ashamed, I am ashamed that this is a policy that we put on these people, good people, willing to die for the country. And that is our policy. I cannot believe it.

Dr. **Conard**. May I say something?

I think that you do have to consider the probable causation of any of these things with radiation exposure. For instance, in the last 2 years I have had several skin cancers removed, and having participated in so many of these atomic bomb tests, I could probably say, well, this is related to radiation exposure, and claim compensation.

But I would not do that, because I know that I never had any radiation burns of the skin to begin with, and second, I was exposed to a tremendous amount of sunlight, ultraviolet radiation, which is far and away more likely the cause of my cancers of the skin.

Senator **Rockefeller**. Thank you, Mr. Chairman.

Senator **Cranston**. Thank you, Jay.

Senator Warner, John, welcome, do you have any questions?

Senator **Warner**. I just commend the Chairman and ranking minority member and members of the committee for working on this tough issue. It is clear the Congress is the court of last resort. It is our responsibility to solve this problem.

Senator **Cranston**. Thank you very much.

David, I have some more questions for you, not too many, and we will get to the veteran witnesses, and I also have some for Dr. Conard.

Do you agree, David, with DNA that the act of welding on a target ship in a contaminated environment would cause additional risk of exposure to radiation?

Dr. **Bradley**. Oh, sure. I think probably that is a cutting torch, and they are cutting some cable, and that will vaporize any fission products and plutonium there, and that stuff in gaseous form will be breathed in even through a gas mask, I think. I believe those gas masks were not very effective.

Senator **Cranston**. Dr. Conard, do you agree?

Dr. **Conard**. [Nods.]

Senator **Cranston**. The answer was yes, for the record.

One of today's other witnesses, Colonel Caldwell of the National Association of Atomic Veterans, was at Operation Crossroads as a rad-safe monitor, and he makes a comment in his testimony as to which I would appreciate your views. Colonel Caldwell notes:

> First of all, the radiological safety section was an organization which performed exactly what its middle name indicated, safety. We were trained, equipped, employed, and functioned as a personnel safety unit. Our training and equipment were not designed for precision data gathering. The data which has survived these 39 years was gathered and reported solely as a tool to protect the men assigned to JTF-1 from injury by the effects of residual nuclear radiation. Any other benefits from this radiation data or information is purely accidental.

Does this agree with your view of your work at Operation Crossroads?

Dr. **Bradley**. Oh, I suppose as a matter of policy and intent, that is pretty close, but we were dealing with film badges that only went up to two roentgens. What do you record for a fellow who is over there sitting on a bollard and has got 200 roentgens under him? His film badge will not show that. Or what do you do with a doggone geiger counter which conks out, which goes clean off scale at about half a roentgen? You cannot deal with it.

So you look in your dosimeter, you make some rough calculations. All that is what I mean by a makeshift operation with inadequate material that you could not count on, and that is what we are building all this edifice of number work out of, junk that you cannot count on.

Senator **Cranston**. Dr. Conard, is it your view that no real precision can properly be ascribed to the radiation monitoring devices used at Operation Crossroads?

Dr. **Conard**. Yes; I think I would agree with that. I think that if—the word "real precision" is difficult to define, but I think that all radiation measurements in the field were approximate and—but reasonably accurate, but not really precise, no.

Senator **Cranston**. DNA—back to you, David—in its comments on the draft GAO report makes the point that personnel decontamination and safety procedures were well developed by the time of Operation Crossroads. In view of your experience at that operation, what is your position on that statement?

Dr. **Bradley**. I told you we had an awful job getting enough shower water—I think it was once every 2 days—and that we did not use any protective clothing.

I think that the use of special clothing, exactly as Dr. Conard has said, when going on those ships on the first day or second day to get the animals off and instruments off, that would be justified because it was a short-term deal. But that is different from going aboard a ship and trying to get the motors going and the blowers going and electrical stuff working so that you could save a ship from sinking. And I do not know whether they were using protective stuff or not, but I would not have wanted to use them if I had been in that situation.

Senator CRANSTON. It is my understanding that before a target ship was reboarded it was first hosed down by a support ship. In your view, would this process, as DNA has asserted, remove most or all of the radiation that could be easily dislodged, leaving only radiation that would be unlikely to come off onto the clothing or skin surfaces of the personnel who then boarded the target ships?

Dr. BRADLEY. It will get rid of the coral sand that is contaminated and deadly hot, if they hose it down well, yes, it will.

The trouble with the fission products is they stick. They are awful sticky things. They get into the wood and into tar, into paint and into rust, and you cannot get rid of them. At least we could not. I was in charge of that darn laboratory work attempting to get the hot stuff off. And by and large, you could not dislodge them outside of using strong acid or sandblasting. And you would not want to put that stuff in the air for people to breathe, or over side with strong acids.

So it was, that after the initial hosing down it was very difficult to reduce the amount of fission products.

Senator CRANSTON. Dr. Conard, the DNA seem to be suggesting that the hosing would remove anything that would cause any danger in coming in contact with skin. What is your view of that?

Dr. CONARD. I do not believe that it would remove all possible contamination, but I think it would have greatly improved the situation, and it would wash off loose material, which would minimize skin contamination and internal absorption.

Senator CRANSTON. Would you have wanted to go aboard one of those ships and be exposed without protective clothing?

Dr. CONARD. As far as I remember, these men that went on the ship wore work clothes, and they were supposed to have their sleeves rolled down, and wear head covers, and if my memory serves me right, I thought that they complied.

Senator CRANSTON. Well, we have had pictures that show that not all people complied——

Dr. CONARD. Yes. Well, of course, I did not go on the target ships.

Senator CRANSTON. In what mode would you have liked to go had you gone on one of those ships?

Dr. CONARD. I would like to go on with protective clothing.

Senator CRANSTON. With protective clothing.

What is your comment on the DNA's testimony that hosing down with contaminated water was not risky in any particular way?

Dr. CONARD. I do not really know. I am not familiar with that.

Senator CRANSTON. DNA in its testimony—back to you, David—notes that radiation safety regulations for all target vessels and their crews were promulgated by July 31, and that these procedures were followed. Is it your recollection that such regs were in fact promulgated and followed at that time?

Dr. BRADLEY. I do not remember, Alan.

Senator **Cranston**. Finally, I have just a few questions, Dr. Conard, for you.

Have you had an opportunity to review the GAO report?

Dr. **Conard**. Very briefly. I really do not feel that I can comment on it at this point.

Senator **Cranston**. Would you study it and submit your thoughts, comments for the record?

Dr. **Conard**. I beg pardon?

Senator **Cranston**. Would you please study it and give us your written comments for the record, not today?

Would you be able to do that?

Dr. **Conard**. I really wonder if I am qualified to do that. When you get to film badge dosimetry and that sort of thing, this is not my field——

Senator **Cranston**. OK.

Dr. **Conard** [continuing]. And I think I would renege on doing that.

Senator **Cranston**. All right. I withdraw the request, then.

You referred to issuing film badges to those for the ship you were responsible for. Did everyone there get a badge?

Dr. **Conard**. No; I think there were representatives that went with each working party, three or four men in that working party, were issued badges. Not all men were issued badges.

Senator **Cranston**. Would any particular person get one every day?

Dr. **Conard**. I cannot recall whether any specific individual got film badges daily.

Senator **Cranston**. Thanks. That concludes my questions of you. I thank you both very, very much, and I guess that concludes all of the questions for this panel.

So we then go on to the veteran witnesses.

The witnesses now will be Fred C. Thompson, an Operation Crossroads participant and Central-East Region vice president of the National Association of Radiation Survivors, Alexandria, VA; Lt. Col. Boley Caldwell, an Operation Crossroads participant and member of the National Association of Atomic Veterans, Dallas, TX; and Anthony Guarisco, an Operation Crossroads participant and the Director of the International Alliance of Atomic Veterans, from Topock, AZ.

Mr. Thompson, I suggest that you lead off, and I would like to express our thanks to you for your patience, for your presence, and we are delighted now to hear from people who were directly involved in the way you were in Operation Crossroads.

Mr. Thompson, would you please start?

STATEMENT OF FRED C. THOMPSON, AN OPERATION CROSSROADS PARTICIPANT AND CENTRAL-EAST REGION VICE PRESIDENT OF THE NATIONAL ASSOCIATION OF RADIATION SURVIVORS, ALEXANDRIA, VA

Mr. **Thompson**. Yes.

Mr. Chairman, members of the committee, and ladies and gentlemen, thank you for the opportunity to tell about my participation in Operation Crossroads.

I am a regional vice president of the National Association of Radiation Survivors. I represent the atomic veterans, the atomic widows, genetically affected children, test site workers, Nevada and Pacific downwind residents, uranium miners, Pacific people, hibakusha, and anyone else who has survived radiation exposure. However, since this is a hearing about Crossroads, I am representing Crossroads veterans today.

There are a few things I want to enter into the record at this point, if I may. In the first place, I have this Crossroads report by Makhijani and Albright. I would like to have that entered into the record.[1]

A recent letter dated December 5 from Natural Rights Center, Tennessee, to Senator Cranston, and this is the one right here, and I would like to have it entered into the record.[2]

Senator **Cranston**. Those—all those will be in the record.

Mr. **Thompson**. Oh, very good.

Well, I enlisted in the Navy at the age of 17 in 1942. World War II was on and I could not wait to get into some action. Because of my age, my dad had to sign for me as a minor till I was 21. I have enclosed a copy of the letter he received upon my enlistment.[3] Now, this is the one that Senator Rockefeller read a while ago.

And I was regular Navy as opposed to reserve. That is why I got stuck on Crossroads. If I had been a reserve I would have got out a lot earlier because I had plenty of points to get out.

After boot camp and service school, I was assigned to the carrier U.S.S. *Intrepid.* I took part in battles from Kwajalein to the first raid on Truk, where I was torpedoed; then I was transferred to the U.S.S. *Kenneth Whiting,* a seaplane tender. I have seen action taken at Eniwetak, Saipan, Peillielu, the Philippines, and Okinawa. At Okinawa we were kamikazed.

After the cessation of hostilities, we were the first American ship into Sasebo, Japan, and I think I received my first shot of radiation there.

The *Kenneth Whiting* was then assigned to Operation Crossroads, a series of three atom bomb shots to be at Bikini Atoll, Marshall Islands. Now, this was not a volunteer situation. As part of the ship's company, since I was regular Navy, I had to go. I lacked 5 months at that time of being 21 years of age. Our officers assured us there was not any danger, and despite misgivings, because all of us knew what radiation had done at Nagasaki and Hiroshima, we proceeded to Bikini.

In retrospect, if I had known how it would turn, I would have jumped ship right then before we ever left the States.

Operation Crossroads was a fiasco from start to finish. Shot Able was a mid-air shot of 20 kilotons. We watched it from approximately 6 miles off. Four hours later we were anchored back in the lagoon. There was no regard for safety at all that I could see. No safety equipment was issued; now, that is to ship's company. No badges were issued except to a few officers. There were a few civilians running around with white outfits on and with Geiger counters and whispering to each other. OK, this made me feel just like you do when you sit in a dental chair and they are taking a picture of you, and they have got on all this protective equipment like a lead apron and they are standing behind a long lead wall, and you are out there getting zapped with radiation. I just wanted you to know how I felt about being out there.

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[1] See p. 520.

[2] See p. 563.

[3] See p. 518.

Our evaporators made water from contaminated lagoon water. We bathed in it, drank it, cooked with it, and used it for sanitation purposes. Now, I have a copy here of where they found out our condensers and our—that is this one right here—where they found out our condensers were radioactive. They found out our evaporator was radioactive. They found out the condenser on the ice machine were found to give 50 milliroentgens per day of gamma activity.

Now, I have to read the next paragraph.

> The ship's engineer expressed a desire to overhaul the evaporators of the ship while it was in San Diego. In view of the rather—and now, this is underlined—in view of the rather high order of gamma and beta activities, I suggest that a monitor be present in order to adequately protect the workmen and advised him to request such a monitor from you.

And so you can see, we—this backs up what I said. We were drinking radioactive water and we were ingesting it. I find none of this in——

Senator Cranston. Do you want to enter that in the record?

Mr. Thompson. Yes, sir, I would like to.

And I find no evidence in my DNA——

Senator Cranston. It will be in the record.[1]

Mr. Thompson [continuing]. Reconstruction.

Thank you, sir.

Now, Test—oh, Arjun—I am not good with his last name, but you know who I mean—and—OK, his name is Makhijani, and David Albright, I would like him to comment on this if we could get him to do it, on this thing that I just entered about the evaporators and the condenser.

Senator Cranston. Who is that you want to comment?

Mr. Thompson. Dr. Arjun Makhijani, and——

Dr. Makhijani. I am the author of——

Senator Cranston. Have you submitted a written statement on that subject?

Dr. Makhijani. Yes.

Senator Cranston. Yes.

Dr. Makhijani. I have not submitted a written statement on this. I just came to know about this this morning.

Senator Cranston. Yes. Well, I would rather not go to you right now.

Dr. Makhijani. Sure.

Mr. Thompson. OK.

Senator Cranston. Yes. If you would submit in writing a statement in regard to what he has stated, then.[2]

Mr. Thompson. OK. Now, Test Shot Baker was even more of a failure, an underwater shot that showered the lagoon and fleet with radioactive debris. This time we were back at anchor in 2 hours and 35 minutes. Well, I have enclosed a copy of the ship's log for the *Kenneth Whiting*, and it will verify that we were back there in 2 hours and 35 minutes.

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[1] See p. 556.

[2] See p. 708.

I would also like that to be entered in the record.

Senator **Cranston**. That will be in the record.[1]

Mr. **Thompson**. Very good. OK. Col. Stafford L. Warren, chief radiological safety section, Operation Crossroads, warned that contamination of personnel, clothing, hands, and even food can be demonstrated readily in every ship in the joint task force.

Now, he was not talking about target ships, he was talking about nontarget ships, too.

OK, well, you can see that was a big failure.

Test Shot Charlie was cancelled. Scuttlebutt said the entire fleet was so radioactive that we were not going to be admitted to the United States at all. We were going to have to sail around forever, I suppose. On the way back, we did jettison a lot of radioactive gear.

In between tests were the times I received most of my radiation. I recall one occasion when I and another petty officer named Koch and a seaman named Larsen had to go aloft and scrape and sand and paint an SK radar antenna. Our hands swelled, got red, and stung. We went to the sick bay and the doctor said it was heat rash and treated us with calamine lotion, which was a treatment for heat rash.

Senator **Cranston**. Do you know if there is any entry made in your medical record in regard to that?

Mr. **Thompson**. No, sir, it would not be. The only time that anything is in your medical record would be—it would be like if it was something that you had to go to the hospital for. Every morning. They would not put anything in there like if you had athlete's feet or something that you had to go, and we all did, and we also had fungus of the ears and stuff like that. It would not be in there.

It might be if you could find the records of sick bay, but not on your own medical record.

Senator **Cranston**. Thank you.

Could I ask you to try to conclude in the next couple of minutes?

Mr. **Thompson**. Yes, sir.

Senator **Cranston**. We have other witnesses.

Mr. **Thompson**. Well, I am going to get right on it, because I got a couple other things that I want to do.

Senator **Cranston**. Your whole written statement is in the record.

Mr. **Thompson**. OK, that is very good.

Well, I have got a few things. Now, Dorothy Legarretta, I have heard her name mentioned this morning, and she sent this just yesterday, so I will not be too good at it. But in—we received 46,000 names from the DNA under the Freedom of Information Act. Now, we have had in the last—October and November we had 5,000 overall replies. Now, 1,054 of those replies were from Crossroads vets. So far, we have found out that 75 percent have problems, and we have a breakdown on it. There is 195 cases of cancer, 124 of cardiovascular, 104 deforming arthritis, 90 bone-to-muscle syndrome, 107 genetic effects in offspring, 81 was sterile, and 81 was dead, and we know that, since there was a way that we sent out the mailing, we know we would have done better if we would have—we only wanted veterans to refer, and so naturally those that were deceased could not refer. But we know that there is more than 81 out of 1,000 that are dead.

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[1] See p. 519.

So you see, if you break down these statistics, 782 out of 1,054 have problems. One quarter, or roughly 263, have no problems at all.

OK, now, that is—I will conclude right there.

Senator Cranston. Thank you very, very much.

Mr. Thompson. Yes, sir.

[The prepared statement of Mr. Thompson follows:]

NATIONAL ASSOCIATION OF
RADIATION SURVIVORS

December 4, 1985
PROPOSED TESTIMONY OF: Fred C. Thompson, Crossroads Veteran
Central-East Region Vice Pres.
NARS/National Association of Radiation Survivors

BEFORE: U. S. Senate
Committee on Veterans Affairs
Russell Senate Office Building
Washington, D. C. 20510
December 11, 1985

Mr. Chairman, Members of the Committee, ladies and gentlemen, thank you for the opportunity to tell about my participation in Operation Crossroads. I am a regional Vice President of the National Association of Radiation Survivors (NARS). I represent the Atomic Veterans, Atomic Widows, Genetically-affected Children, Test-Site Workers (Nevada/Pacific), Downwind Residents, Uranium Miners, Pacific People, Hibakusha, and anyone else who has survived radiation exposure. However, since this hearing is about Crossroads, I am representing Crossroads veterans.

I enlisted in the Navy at the age of seventeen, in 1942. World War II was on and I couldn't wait to get some action. Because of my age my Dad had to sign for me, a minor, until I was twenty-one. I have enclosed a copy of the letter he received upon my enlistment.

I was Regular Navy, as opposed to Reserve, which was why I got stuck on Crossroads. If I had been a reserve I would have had more than enough points to get out at the end of the war.

After boot camp and service school I was assigned to the carrier U.S.S. Intrepid. I took part in battles from Kwajalein to the first raid on Truk, where we were torpedoed. Then I was transferred to the U.S.S. Kenneth Whiting, a seaplane tender, seeing action in taking Eniwetok, Saipan, Peillielu, the Philippines, and Okinawa. At Okinawa we were kamikazied. After the cessation of hostilities we were the first American ship into Sasebo, Japan, where I received my first shot of radiation.

The Kenneth Whiting was then assigned to Operation Crossroads, a series of three atom bomb shots to be at Bikini Atoll, Marshall Islands. This was not a volunteer situation; as part of the ship's company I had no choice; I had to go - I was Regular Navy and lacked 5 months of being 21 years of age. Our officers assured us there wasn't any danger, and despite misgivings (all of us knew what radiation had done at Nagasaki and Hiroshima), we proceeded to Bikini. (In retrospect, if I had known how it would turn out, I would have jumped ship.)

Operation Crossroads was a fiasco from start to finish. Shot Able was a mid-air shot of 20 Kilotons. We watched it from approximately six (6) miles off; four (4) hours later we were anchored back in the lagoon. There was no regard for safety at all that I could see. No safety equipment was issued; no badges were issued except to a few officers. There were a few civilians running around with white outfits on and with geiger counters and whispering to each other. (This made me feel like you feel when you sit in the dental chair without any protection, and the x-ray technician has a lead apron on and stands behind a lead wall while you are getting x-rayed.) Our evaporators made water from the contaminated lagoon water. We bathed in it, drank it, cooked with it, and used it for sanitation purposes.

Test shot Baker was even more of a failure; an underwater shot that showered the lagoon and fleet with radioactive debris. This time we were back at anchor in two hours, 35 minutes (See copy of Ship's Log enclosed). Col. Stafford L. Warren, Chief, Radiological Safety Section of Operation Crossroads, warned that "Contamination of Personnel, clothing, hands, and even food can be demonstrated readily in every ship in the JTF-1 (Joint Task Force-One) in increasing amounts day by day." (See "Irradiation of Personnel During Operation Crossroads" by Dr. Arjun Makhijani and David Albright, copy enclosed.)

Test shot Charlie was cancelled. Scuttlebut said the entire fleet was so radioactive that we weren't going to be admitted to the U.S. We did jetison a lot of radioactive gear.

In between tests were the times I received most of my radiation. I recall one occasion when I and another petty officer named Koch and a seaman named Larsen had to go aloft and scrape and sand and paint a S.K. radar antenna. Our hands swelled, got red, and stung. We went to sick bay and the doctor said that it was heat rash and treated us with calamine lotion. I still have two red spots on my right arm and one on my chest as souvenirs of Operation Crossroads.

I was discharged in December, 1946. My ship had not been "decontaminated" (See U.C. Crocker Radiation Lab Memo of 26 August 1946, copy enclosed), but the Navy as usual ran up the "well done" flag.

About sixteen years later I began to have a lot of trouble with my joints, especially in my wrists, forearms, and shoulders. The joint problems and pain have intensified until I am now in constant pain and walking with difficulty using a cane. I have had both hands operated on, and my teeth removed. I have a heart condition, and have just learned I have diabetes. I blame all this on the radiation I received at Operation Crossroads.

NARS, the organization I represent, has about 600 Crossroads veterans. I have talked to a lot of them, and can give a fairly accurate profile. They are 58-65 years old; were 18-25 years old at Crossroads; were Regular Navy (the Reserves got out at the end of the war); all of them have muscle and joint problems; a lot have heart and/or diabetes; some have genetically-damaged children, and some have left grieving widows. All feel betrayed by the Government. One other statistic stands out - most of them have a summary of exposure from the Defense Nuclear Agency of 0.322 Rem Gamma, with no mention of Alpha or Beta (See copy of my DNA Dosage Report enclosed).

The Government refuses to take responsibility for the 42,000 Crossroads veterans. The Veterans Administration has rejected 99-1/2% of their claims, and we are running out of time. We appreciate the help that the Committee has given, but most Crossroads veterans do not have time for any two or three years of studies. We ask you gentlemen to do what the Canadian and Japanese governments have done and what our government has done for the POW's, and that is to compensate its atomic veterans for all radiation-related health problems. (See the Washington Post article of March 17, 1982 and Potomac News article of November 28, 1984, copies enclosed.)

Finally, I would ask you to warn our young boys and girls entering the armed forces of the dangers of radiation - I wish to God someone had warned me.

Encls. (7)

U. S. NAVAL TRAINING STATION
GREAT LAKES, ILLINOIS

My father received
this in Dec. 1942
Three yr 7months later the Navy
nuked me

My Dear Sir:

We are happy to inform you that your son has reported to this Station for prescribed recruit training, and to assure you that the United States Navy gladly accepts the responsibility for his welfare and security.

When a man enlists in the Navy, he is assigned to a Naval Training Station for fundamental recruit training. The first twenty-one days at the Training Station are spent in detention, which is necessary as a health measure.

During the training period, the Navy endeavors to produce a future leader of men, of whom his community, his family and the service will be proud. The physical, mental and moral welfare of the recruit is assured; religious counsel and the opportunities for public worship being ever-present. Men of all faiths are under the constant supervision of the Chaplains' Corps, which conducts services on the Station.

Good health, a Navy tradition, is furthered by prohibiting visitors during the detention period, thereby guarding against the spread of contagious diseases. Your son will be instructed to advise you when he completes this period of detention.

Cheerful letters from home are of real benefit to the recruit, and are the best means of encouraging him to correspond frequently. Although the recruit is instructed to write home often, he sometimes fails to do so. This should not be a cause for alarm, however, for you will be notified immediately in case of his serious illness. Letters addressed to him at "U. S. Naval Training Station, Great Lakes, Illinois, Company________," will be delivered promptly while he is in training. You should instruct him to keep you informed of changes in his address, so that his incoming mail will not be delayed.

On the day of graduation the recruit may receive visitors from 9 a. m. until 6 p. m. Men out of detention may receive visitors Saturday between 3:30 and 6 p. m., and Sunday afternoon from 1 p. m. until 6 p. m. Patients at Naval Hospital may receive visitors between 2 p. m. and 4 p. m. Saturday and Sunday only. Persons confined in Main Brig may receive visitors on Sunday afternoons between 1 p. m. and 3:30 p. m.

In the event of serious emergencies, your son should be notified by telegraph, as incoming telephone lines are reserved for official use. If a return call is requested, public telephones are available for his use. Other than the prescribed procedures, because they digress from established routine, will result in unnecessary delays.

Inquiries regarding enlisted men should be addressed to the Recruit Training Officer. U. S. Naval Training Station, Great Lakes, Illinois.

Sincerely yours,

John Downes
Rear Admiral, U. S. Navy, Commanding

NTSGL—[illegible]—11-4-42—40M

Encl # 2

[redacted]

DECK LOG—REMARKS SHEET

PAGE

UNITED STATES SHIP KENNETH WHITING (AV-14) Thursday 25 July, 19 46

0000 - 0400

Anchored in Berth 55, Bikini Atoll, Marshall Islands, in 24 fathoms of water, with 90 fathoms of chain to the starboard anchor, on the following anchorage bearings: Beacon "C" 121½° (T); Beacon "D" 077° (T); Beacon "E" 033° (T). Boilers # 1 and 2 are in use for auxiliary purposes. Modified condition YOKE is set. SOPA is Vice-Admiral W. H. P. Blandy, USN, in U. S. S. Mt McKINLEY (AGC-7).

M. H. FENN
Gunner, USN.

0400 - 0800

Anchored as before. Made all preparations for getting underway. 0442 - Bikini Island personnel reported on board in accordance with evacuation plans of JTF-1 for BAKER day. 0445 - Mustered crew and crossroads personnel on stations. Absentees: none. - Set all special sea and anchoring details. 0505 - Enyu Island personnel reported on board in accordance with evacuation plans of JTF-1 for BAKER day. 0511 - Underway from Berth 55, Bikini Atoll, Marshall Islands, in accordance with evacuation plans of JTF-1 for BAKER day, executive officer at conn, captain and navigator on the bridge, maneuvering on various courses and speeds to conform with the channel standing out of Bikini Lagoon, standard speed 15 knots (68 r.p.m.). 0548 - Secured all special sea and anchoring details. 0552 - Passed Entrance Buoy # 2 abeam to port on course 163° (T and G), 170° (PSTC). 0558 - Changed course to 080° (T and G), 068° (PSTC), changed speed to 2/3 standard. 0615 - Changed course to 027° (T and G), 007° (PSTC). 0628 - Changed course to 024° (T and G), 004° (PSTC). 0724 - Arrived on station eight miles from point AUTO with center of target array bearing 253° (T), as authorized by JTF-1 despatch 211122Z. Commenced maneuvering on various courses and speeds in accordance with JTF-1 Operation Plan 1-46.

J. SAWULA
Lieutenant, USN.

0800 - 1200

Steaming as before. 0800 - By order of the commanding officer, Moss, I (n)., 570 93 24, StM3c, was released from confinement and restored to duty, the period of confinement imposed on him at captain's mast having expired. 0825 - All hands to quarters for ATOMIC bomb stations. 0835 - ATOMIC bomb exploded. 0845 - Dismissed crew from quarters. 0936 - Engines ahead standard 15 knots (68 r.p.m.). 0941-Settled on course 211° (T and G), 214° (PSTC). 1025 - Made daily inspection of magazines and smokeless powder samples. Conditions normal. 1028 - Commenced maneuvering on various courses and speeds to conform with channel approaching anchorage, captain at conn, executive officer and navigator on the bridge, standard speed 15 knots (68 r.p.m.) steaming at 1/3 standard. 1040 - Set all special sea and anchoring details. 1100 - Anchored in Berth OBOE, Bikini Atoll, Marshall Islands, in 27 fathoms of water, with 90 fathoms of chain to the starboard anchor on the following anchorage bearings: Beacon "A" 129½° (T); Beacon "B" 045° (T); Beacon "C" 012° (T). 1109 - Secured all special sea and anchoring details, main engines on one hour notice.

E. D. Jones
E. D. JONES
Lt. Comdr., USN.

1200 - 1600

Anchored as before.

C. HARTIGEN III
Lieutenant, USNR.

1600 - 2000

Anchored as before. 1824 - Observed sunset.

O. V. McCURRY
Chief Boatswain, USN.

2000-2400 Anchored as before.

APPROVED:

EXAMINED:

**International Radiation Research
and Training Institute (IRRTI)**

IRRADIATION OF PERSONNEL DURING OPERATION CROSSROADS:

AN EVALUATION BASED ON OFFICIAL DOCUMENTS

BY

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MAY 1983

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PREFACE

This report is based on official documents of Operation Crossroads. Most of them are those of the late Colonel Stafford L. Warren who was the Chief of the Radiological Safety Section during Operation Crossroads. He had donated the declassified (formerly secret and top secret) papers to the library of the University of California, Los Angeles. Anthony and Mary Guarisco painstakingly went through them, sifted them and made copies available to us. Without their initiative, insight and work, this report would not have been possible. Walden Bello also provided some useful materials.

Dr. Karl Z. Morgan reviewed it and, as a scientist who was present at Operation Crossroads, provided many useful comments, insights and details. E. Cooper Brown, Glenn Alcalay and Kathleen Tucker also gave us useful comments and editorial help. Besides reviewing it, Bob Alvarez also arranged for us to work on this as a joint project. Lewis Wood and Diana Kohn typed it. We thank them all.

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Chapter I

Summary and Conclusions

> "Col. Fields said that Gen. Groves [the director of the Manhattan Project which made the first atomic bombs] is very much afraid of claims being instituted by men who participated in the Bikini tests."
>
> Decontamination Report

The official documents of Operation Crossroads, which consisted of two atomic bomb tests, show that it was conducted in a manner which was grossly negligent regarding radiological safety for the 42,000 people who witnessed it. Conditions were particularly bad in regard to the second atomic test, named "Baker," on July 25, 1946.*

Test Baker was to be the first ever underwater explosion. Conditions were therefore particularly uncertain. The Radiological Safety Section had predicted that if the radioactive "column" from the explosion did not rise more than 10,000 feet -- as was in fact the case -- that radiological conditions would be "extremely serious." It was further predicted that the radioactive spray would utterly contaminate the target ships which "may remain dangerous for an indeterminable time thereafter."

The commanders responsible for the tests paid little heed. "Since the nature and extent of the contamination was completely unexpected," states the Decontamination Report written afterwards, "no plans had been prepared for organized demontamination measures." The documents confirm that a cavalier attitude toward safety prevailed among many of the officers who "insisted on the blind 'hairy-chested' approach to the matter [of radiological safety] with a disdain for the unseen hazard," according to Capt. Lyon of the Radiological Safety Section.

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*This report evaluates conditions on and after July 25, 1946, since the documents we have relate to that period. Most of them came from the papers of Col. Stafford L. Warren, a physician, who was the Chief of the Radiological Safety Section at Operation Crossroads.

Test Baker sent up a million-ton column of radioactive water, spray and steam about 6,000 feet high which came raining down on Bikini lagoon and the target ships, irrevocably contaminating almost all of them with the products of atomic fission and with plutonium, considered then as "the most poisonous chemical known."

On the very day of Test Baker, men were sent into the radioactive lagoon and the beaches to measure radioactivity and retrieve instruments. Within three days, they were also sent on highly radioactive ships to measure radiation and to retrieve equipment, instruments and experimental animals. All the non-target ships on which the men lived and worked were moved into the radioactive lagoon (some as early as the day of the test itself), and subsequently became contaminated. This action occurred in spite of Col. Warren's warning of "the possibility of an *indirect* hazard due to the concentration of radioactive products..."

Decontamination efforts were started on intensely radioactive ships even though "no one as yet know how to decontaminate" a ship. The Department of Defense exposed about two hundred ships to contamination at Bikini, thousands of miles away from substantial port facilities, without ever attempting to experimentally contaminate and then decontaminate a single ship! In spite of this admitted ignorance, men were exposed to the extreme dangers of attempting to decontaminate the target ships -- a futile effort which eventually had to be abandoned because of severe radiation hazards, and many of the ships were eventually sunk.

The operation subjected the personnel to large, and in some cases, increasing radiological dangers. Col. Warren noted that "contamination of personnel clothing, hands and even food can be demonstrated readily in every ship...in increasing amounts day by day." (Emphasis added)

There was a "widespread presence of an alpha emitter [plutonium] in the target area." Yet, "no alpha detectors for general field use were available." Little protection from inhalation or ingestion of this most deadly chemical was given to the men. Yet after shot Baker it was present on the ships' surfaces, in the evaporators, in the spray and mist which resulted from cleaning the target ships. Similar dangers existed with respect to the fission products.

Even in the case of gamma radiation (which is like X-rays), the radiation levels on the ships varied considerably and were intense in many places. Merely "lingering" in a place with high radiation for a few minutes could cause a dose ten times the daily "tolerance" limit.

As a result, it was common for men to be exposed over the daily "tolerance" limits. Men who slept aboard some target ships like the New York could have received 20 times the "tolerance" limit of 0.1 roentgen per day during a night. Lingering in a "hot-spot" whose locations were often unpredictable could cause the daily exposure limit to be reached in 45 seconds. Col. Warren found it "exceedingly common" that beta radiation doses to hands were above standard and "not infrequent" that they bordered on the erythema dose of 300 rads. We must note here that even the "tolerance" dose was very high by today's standards. According to Dr. Warren, the intermediate dose calculation on which it was based was "pure guess." As a result, these limits for industry were repeatedly lowered so that they are today about one sixth of the value adopted then (on an annual basis). The "tolerance" limits at Bikini were more than 5,000 times the allowable limit of 5 millirems per year set by the Nuclear Regulatory Commission for nuclear power plant operators.

A great many men did not wear film badges -- the minimal equipment required to measure gamma radiation. The instruments available to the radiation safety monitors were "experimental," many of which "all too often failed to work entirely," and when they did were often "erratic" and "misleading." "I am not an alarmist, Dr. Warren," wrote Dr. Myers, one of the safety monitors. "I do believe though that many of us probably received much more penetrating ionizing radiation than the instruments of very low beta-sensitivity were able to record."

The radiation dose standards set for the operation were those set by the Bureau of Standards for manufacturing plants. However, with atomic explosions, the conditions obtaining in industrial plants do not apply. The distribution of radiation was erratic and essentially unknowable. For hazards such as plutonium, no field instruments were available at all. Those available were erratic or failed to work entirely. Coupled with the "hairy-chested" "attitude of indifference" to radiation hazards on the part of many officers, it is no wonder that Col. Warren, the Chief of the Radiological Safety Section, exclaimed "I never want to go through the experience of the last three weeks of August [1946] again."

In terms of the hazards to an estimated 250,000 military personnel involved in atmospheric bomb testing, the Defense Nuclear Agency claims that overall "Exposures generally were well within established radiation exposure limits [and] there was no reason to expect any increased health risk."

The documents show that:

- Film badge records often exceeded daily "tolerance" limits.
- The "indifference" of officers to radiological safety led them to keep men for long periods in high radiation areas, often in violation of radiological safety rules and guidelines.
- Radiation instruments often did not work.
- The beta radiation danger was great both from external and internal sources -- it was "exceedingly common" to find dose limits being exceeded.
- Alpha contamination [plutonium] was "extensive and unpredictable" to the extent that "no one can say any place is safe for any length of time."

The Defense Nuclear Agency claims in particular that the "internal doses have proven to be essentially insignificant." Yet the observations above from the documents and Col. Warren's note that "any surface of any vessel may be in fact the residence of many lethal doses" shows that the Agency has not taken the facts into account while making this sweeping generalization. Indeed, it is more than likely that a great many of the men who were made to do work such as sweeping, scrubbing, hosing down decks, scraping and repainting the sides of some ships, inhaled and ingested very dangerous quantities of fission products and plutonium. Even changing clothes and eating was dangerous since fission products were found on clothing, food and hands "in every ship...in increasing amounts day by day."

The documents do not give us sufficient evidence to reconstruct doses. But they do definitely tell us that the Defense Nuclear Agency's claims of generally low doses and "insignificant" internal doses is without regard to essential facts and hence without scientific merit. This will continue as long as the Defense Nuclear Agency does not take the testimony of the atomic veterans regarding their activities as fundamental data needed for any and all dose reconstruction exercises.

Chapter II

Operation CROSSROADS: Introduction

> "...I never want to go through the experience of the last three weeks of August [1946] again. ..."[1]
>
> Col. Stafford L. Warren
> Chief, Radiological Safety Section

On July 1st and July 25, 1946, the U.S. Military conducted two atomic bomb tests off Bikini Atoll in the Marshall Islands. The first, Test Able, was exploded in the atmosphere above the lagoon. The second, Test Baker, was exploded underwater, in the lagoon.

Forty-two thousand people (mostly naval, but also Army and Air Force personnel, as well as civilians) witnessed these first atomic explosions after Hiroshima and Nagasaki.[2] Their purpose, according to the Joint Task Force One that was established to conduct them, was "primarily to determine the effects of atomic explosions against naval vessels" and "secondarily, to obtain as far as practicable the effects of atomic explosives against ground targets and airplanes and to acquire scientific data of general value."[3]

There were 84 "target ships" positioned around "ground zero" with instruments and animals and about 100 non-target ships. Test Baker was a shallow underwater detonation that sent a million-ton column of water spary and steam shooting six thousand feet up.* This very radioactive water came raining down on the lagoon, the beaches and the target ships and severely contaminated them. The blast precipitated immense waves which further contaminated all these places. Within a few days the non-target ships were moved back into the lagoon. These ships also became increasingly contaminated as radioactive materials were selectively deposited on and in them.

---

*This evaluation of Operation Crossroads is about the period after this second test on July 25, 1946, because most of the documents on which it is based relate to that period.

The indications are that the overwhelming majority of people involved received considerable doses of radiation from a number of sources:

- Living and working aboard non-target ships;
- Retrieving experimental animals and equipment aboard the target ships and from the lagoon and beaches;
- Measuring the radioactivity in the area of the explosion and on the target ships;
- Attempting to decontaminate the target ships; and
- Preparing target ships for towing both within the lagoon and out of it.

Other people not present at the tests also no doubt received radiation doses as a result of subsequent experimental and decontamination work at Kwajalein Atoll, San Francisco and other ports. Almost all the target ships were so contaminated that they could not be salvaged and were sunk in deep water.

This evaluation of the radiological conditions at Bikini, their effect on the people present, and the adequacy or lack thereof of the radiation standards is based on the documents prepared by the participants in the test -- principally those of the personnel in charge of the Radiological Safety Section. The documents, which were obtained from the papers of the late Col. Stafford L. Warren, the Chief of that section, show that ~~the~~ manner in which the operations were conducted makes it impossible to precisely estimate how much radiation the various participants received. However, the evidence, both in regard to the radiation measurements and the conditions of life and work, also shows that it is likely that significant numbers of people probably received very high doses of radiation in tissue destructive ranges.

References to Chapter II

1. Col. Stafford L. Warren, letter to Dr. William G. Myers, December 31, 1946.

2. Joint Task Force One, Report on Atomic Bomb Tests ABLE and BAKER (Operation CROSSROADS), Navy Department, Washington, D.C., 15 November 1946.

3. Ibid., p. 1(A)(1)

Chapter III

Radioactive Contamination and Exposures

> "The initial contamination of surfaces was so great that reduction on the deck and other surfaces of 90% or more still leaves large and dangerous quantities of fission [products] and alpha emitters scattered about...
>
> "Contamination of personnel, clothing, hands, and even food can be demonstrated readily in every ship in the JTF-1 [Joint Task Force-One] in increasing amounts day by day."[1]
>
> Col. Stafford L. Warren
> Chief, Radiological Safety Section

The decision to conduct the atomic explosions Able and Baker was made only about six months prior to the first test on July 1, 1946. Within that time more than forty thousand men had to be assigned to and assembled at Bikini and other preparations, including those for radiological safety, had to be completed.

The conditions for radiological safety were not promising. An atomic explosion had never been set off underwater. In spite of this, the Navy did not attempt to experimentally contaminate and decontaminate a single ship before taking the fleet to Bikini, thousands of miles from any port with substantial relevant supporting facilities.

The radiological safety section had clearly warned of an "extremely serious" situation if the radioactive "column" from Test Baker did not rise more than 10,000 feet -- as in fact did happen. The prediction warned of "most significant contamination due to direct deposition of fission products...in the water of lagoon, on surface ships and in the fallout....On some target ships possibly within 1,000 yards of detonation, boarding inspection may be dangerous for weeks..."[2]

The warning of the possibility of serious contamination was ignored by those in charge of the operation, since no preparations for the possibility were made. The official Decontamination Report states:

> "Since the nature and extent of the decontamination was completely unexpected, no plans had been prepared for organized decontamination."[3]

This lack of planning meant that a great many officers were unprepared and did not take radiation safety seriously. They were given little training in such matters. The overwhelming majority of the rest of the 42,000 people received even less. Without a systematic program of radiological indoctrination for the personnel, a staff of less than 400 of the Radiological Safety Section was confronted with an almost impossible task.

Only a handful of these had any experience with radiological safety as it concerned atomic explosions. Many had no prior experience with radiological matters at all, civilian or military. Only thirty three "were given a fairly thorough two and a half month course."[4] The rest received some training aboard the USS Haven during the four weeks prior to the test.

A. The Contamination of the Ships

> "...no one yet knew how to decontaminate..."[5]
>
> Decontamination Report of
> Operation Crossroads

Immediately after Test Baker, it became apparent that almost all target ships not sunk by the explosions, as well as the waters of the lagoon and substantial portions of Bikini Island itself, had become severely contaminated. The result of the test corresponded to the most dangerous of the contingencies outlined in the prediction: "Extremely Serious."

In addition to contamination by the radioactive spray and rain, the explosion scoured up coral sand from the bottom of the lagoon which became radioactive and some of which was deposited on the target ships. A pile of sand on one target ship gave a reading of 200 roentgens per day -- two thousand times the "tolerance radiation limit per day set for personnel exposure -- twenty days after the test.[6] Some materials like wood decks and manila line selectively absorbed radioactive matter. In all these ways the ships became "dangerously hot,"[7] with the radioactivity spread out very unevenly and unpredictably.

On the very day of Test Baker, non-target boats and ships were sent into the lagoon. And only one day afterwards, the Commander of Joint Task Force One "authorized vessels at anchor in the lagoon to operate evaporators."[8] At that time, there was not only radiation from fission products and plutonium, but also very intense radiation from sodium-24 and other activation products.* This was again in contradiction to the warning in the safety prediction that:

> "there is the possibility of development of an indirect hazard due to concentrating radioactive products particularly in the form of salts in condensers, evaporators, and perhaps other places on ships entering the lagoon prior to the time that the contamination is greatly reduced. It is very difficult to evaluate the likelihood or the magnitude of this possibility -- but it must be anticipated."[9]

Apparently without checking the non-target vessels already sent into the lagoon for contamination by these means, the rest of the non-target ships were moved into Bikini lagoon to "regularly assigned berths" within six days of the test.[10] As a result, every non-target ship became contaminated in the manner predicted -- fission products and plutonium were selectively concentrated in salt water pipes, evaporators and condensers. In addition, coral, algae and other organic materials which selectively concentrated radioactive materials adhered to the body of the ship below the water-line, creating a decontamination problem of immense difficulty and danger. In fact, at the time "no satisfactory means of decontamination of underwater bodies and salt water systems in the Bikini area was apparent."[11]

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*Some of the neutrons produced by the fission of plutonium were absorbed by sodium rendering it radioactive, which was also true of some other elements in the seawater. These "activation products," particularly sodium-24, were a principal source of radioactivity in the lagoon and on the island for the first two days after Test Baker.

It was only after the radioactive ships reached San Francisco and other major ports, followed by extensive experimentation and work, that the levels of radioactivity were substantially reduced. In the meantime, the sailors received radiation doses as they lived and worked aboard. In fact, some radioactive ships were cleared for occupancy before decontamination because Operation CROSSROADS had contaminated so many ships that the Pacific Fleet was experiencing shortages. On September 9, 1946, the "Commander Western Sea Frontier" stated:

> "Districts have insufficient personnel to effect full clearance of vessels and, furthermore, no one yet knows how to decontaminate. Consequently, several APA's, Destroyer Division 72 and some auxiliaries have been cleared practically to meet operational requirements on the basis that they might as well continue to operate until methods of making them safe for overhaul are developed."[12]

In spite of the fact that no one knew for months after the tests how to decontaminate the partially contaminated non-target ships, attempts to decontaminate the much more severely and extensively contaminated target ships began only a few days after Test Baker.

B. The Irradiation of Personnel

> "Every contaminated place as evidenced by the gamma or beta radiation on any surface of any vessel may be in fact the residence of many lethal doses of this alpha emitter [plutonium]."[13]
>
> Col. S. L. Warren
> Chief, Radiological Safety Section

The lack of adequate preparation and training of the personnel and the insufficient number of radiological monitors began to be apparent within a few days. On non-target ships Dr. Karl Z. Morgan (Director of Health Physics at Oak Ridge National Laboratory) found that "radioactive salt water was being used to wash meat racks on the USS Saidor."[14] On the target ships, the radiation monitors noted the cavalier attitudes of many officers:

> "It appears that there is an attitude of indifference on the part of the ship's officers of the Prinz Eugen to the safety standard set by RadSafe. There is reason to believe that men are being kept aboard for longer periods than they should be and also that the standard of 0.1R has such a large safety factor that it can be ignored. Some of the men who were observed to be aboard the ship when we came aboard at 0800, ...were probably on the ship all that night and...until 1200 of the same day."[15]

Since some of the radiation levels measured were as high as 5 roentgens per day, which would have given the "tolerance" dose of 0.1 roentgen in about half an hour, some men aboard could have received 2 roentgens or more of gamma radiation during the night. In addition, a handwritten note on the memo says that there was "evidence of dry sweeping and sleeping aboard" the target ships. Sweeping was a hazardous practice because of the heightened danger of inhaling resuspended fission products and plutonium.

Almost a year later, Captain Lyon, evaluating radiological safety in response to a written complaint from Ensign Coffin, noted that there were officers "like Captain Maxwell who insists on a 'hairy-chested' approach to the matter with a disdain for the unseen hazard, an attitude which is contagious to the younger officers and detrimental to the radiological safety program."[16]

With this "hairy-chested" approach on the part of many officers, it is not surprising that enlisted men were violating basic radiological safety rules, such as sleeping on board target ships.

All the personnel at Operation CROSSROADS were constantly exposed to alpha, beta, and gamma radiation from plutonium and the other radioactive elements which were the result of the explosion. Alpha radiation consists of two protons and two neutrons tightly bound together (identical to the nucleus of a helium atom) which only penetrate the outer layers of skin. However, alpha emitters like plutonium are extremely damaging, even in microscopic amounts, when they are inhaled or ingested and become part of the body. They can then severely damage the cells around the spot where they become incorporated. Beta radiation consists of electrons, several thousand times lighter than alpha particles, and more penetrating. External beta radiation generally damages cells on or near the surface of the skin. However, beta radiation from some fission and activation products have a range up to one centimeter (0.4 inch) in soft tissue. There is thus the risk of damage to the lenses of the eyes, male gonads, thyroid and some lymph nodes. Beta emitters can be incorporated into parts of the body where they irradiate internally with the possibility of severe damage (e.g., strontium-90 to the bone). External whole body radiation comes primarily from gamma rays, which are high energy rays like X-rays, and which can penetrate through to various parts of the body. These rays can pass through the body without harming any cells, or kill cells, or damage cells.

C. Gamma Radiation

> "It is most likely that a number of persons not carrying film badges were likewise over-exposed."[17]
>
> Medico-Legal Board

On the first days after Test Baker, some of the target ships were so radioactive that the "tolerance" dose of 0.1 roentgen per day* would be exceeded in less than one minute. In spite of this, men were sent aboard ships in the first few days after Test Baker. Every one of several hundred test animals had been retrieved by these men within the first five days.[18] Similarly men and boats were sent into the lagoon and onto the beaches to measure radioactivity and retrieve equipment on the very day of the test. The lagoon and the beaches were extremely radioactive not only from fission products and plutonium but also because of the neutron-induced radioactivity in sodium. The gamma and beta radiations from sodium-24 are of very high energies and can cause (correspondingly) greater damage. Organic matter such as ropes and canvas had extremely high concentrations of radioactivity, in many cases "greater than 200 roentgen per 24 hours (the maximum which could be read with the instruments available."[19] It is most likely that many people received extremely high doses to all or part of their bodies near such things.

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*A roentgen is a unit which measures ionizing radiation by the amount of air it ionizes. It is no longer in common use, but is approximately equivalent to one rad which is a measure of the amount of radiation absorbed per gram of matter (1 rad = 100 ergs per gram; 1 roentgen approximately equals 93 ergs per gram of soft tissue). The "tolerance" dose on an annual basis was 30 roentgen.

Similar dangers persisted after the first few days when the average level of gamma radiation had subsided considerably. The deposition of radioactive materials was extremely uneven so that a person lingering in such a "hot spot" with a gamma reading of 200 roentgen would receive a dose in excess of the daily "tolerance" limit in about 45 seconds.

It is, however, impossible to estimate the full extent of overexposure for individuals from the documents that we have. The "attitude of indifference" of many officers to safety meant that it was common to find men aboard a "ship in large quantities without film badges or monitors. These men were in superstructures where readings of five roentgen [per day], were common." Such readings meant that a week of four-hour shifts might produce a whole body gamma dose in excess of 5 roentgens. Where film badges were worn, many cases of overexposure were recorded on specific days, even with respect to experienced radiation monitors.[20]

D. Beta Radiation

> "Contamination of hands and faces with beta emitters of intensities greater than tolerance (0.8R/day) is exceedingly common. It is not infrequent to find personnel with bare hands bordering on erythema dose levels if not removed within 24 hours..."[21]
>
> Col. S. L. Warren
> Chief, Radiological Safety Section

The average value of beta radiation found was ten times greater than gamma; though in setting the standards, the Medico-Legal Board had assumed this ratio would be only five-to-one. Consequently personnel receiving "tolerance" doses of gamma radiation were receiving, on the average, twice the "tolerance" dose of beta radiation. Moreover, much higher ratios of beta to gamma radiation were also common. It is probably for this reason that Col. Warren found overexposure to beta radiation "exceedingly common." It is to be emphasized that doses "bordering on erythema"* are equivalent to 300 rads or more to the skin. Yet, the conditions were such that, according to Col. Warren, it was "almost impossible to enforce the wearing of gloves continuously on badly contaminated ships....Nor is it feasible to expect them to take care of their contaminated clothes."[23]

The inhalation hazard for fission products from "fine dry particles, spray and fine water droplets" was so serious and insidious that even ordinary masks did nothing but provide a "false sense of security."[24] Only a special U.S. Navy "Breathing Apparatus" would be effective and it appears that such was not in general use for several weeks after Test Baker, if ever. We were not able to determine from the documents whether or not such apparatus was available for the decontamination work and not used.

Even changing contaminated work clothes was a hazard since it loosened radioactive particles and created a greater inhalation danger -- and possibly substantial internal doses.

E. Alpha Radiation

> "Every contaminated place as evidenced by the gamma or beta radiation on any surface of any vessel may be in fact the residence of many lethal doses of this alpha emitter [plutonium]. This alpha emitter is the most poisonous chemical ~~known. It can only~~

---

*Erythema is inflammation or reddening of the skin.

> be measured with very precise equipment which is not available and cannot be made available."[25]
>
> Col. S. L. Warren
> Chief, Radiological Safety Section

Plutonium, an alpha emitter and the basic ingredient of the atom bombs exploded at Operation Crossroads, was mixed in with the fission products and distributed throughout the test site in the same way as the fission products. Col. Warren noted on August 7, 1946, that "some of the most important ships have many lethal doses deposited on them and retained in crevices and other places." A few days later he concluded that "no one can say any place is safe for any given length of time" because of the unpredictable presence of alpha emitters and a lack of protective and measuring equipment.*

Still for weeks after the test, men boarded the target ships, hosed, scrubbed, swept and scraped them and prepared the ships for towing. The men even slept aboard them. They were thus constantly exposed to the danger of inhaling fine spray or particles which contained plutonium and/or fission products and neutron induced radionuclides. It is of particular relevance to note that recent research has revealed that "plutonium is concentrated on the sea surface and in sea spray."[28] The men were thus subject to a greater hazard from plutonium inhalation than previously believed. Just by being there and breathing the spray from the waves it was possible to inhale dangerous quantities of plutonium -- to say nothing of the activities that further stirred it up and increased its presence in the air as the men worked. In was, indeed, as Col. Warren came to conclude a few months later, an "insidious hazard" that pervaded the entire area.[29]

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*Karl Morgan's report[27] shows no alpha emitters in the few air samples tested for them with filtration equipment. This equipment worked erratically under the conditions of high temperature and humidity at Bikini. So its use was strictly limited. Moreover, the measurements were only made on a few non-target ships (date of measurement is uncertain) and did not apply to the conditions of resuspension of alpha emitters lodged in rust, paint, wood, etc. as the men worked. Chemical analysis showed extensive plutonium contamination of the ships. In one case, this applied to a sample which had been declared free of alpha emitters by an on-the-spot check.

F. Some Legal Aspects

> "Col. Fields said that Gen. Groves [the director of the Manhattan Project which made the first atomic bombs] is very much afraid of claims being instituted by men who particpated in the Bikini tests."[30]
>
> Decontamination Report

There is some evidence that many of the assurances regarding safety were made with an eye to answering future claims of radiation injury. The Medico-Legal Board declared that its initial purpose was to "reassure Col. Warren that the safety measures adopted by RadSafe were such as to attract no justifiable criticism, and to give what assurance was possible that no successful suits could be brought on account of the radiological hazards of Operation Crossroads."[31]

Given the extensive contamination, the lack of training of the personnel, the ignorance about decontamination procedures, the lack of adequate instruments, etc., the Radiological Safety Section clearly worked under some apprehension and considerable strain. When their contracts were up in mid-August, "attempts to delay these men were met with unanimous refusal."[32] Col. Warren was clearly seriously concerned about the overexposures and the serious hazards in which the men were working.

> "The target vessels are in the main extensively contaminated with dangerous amounts of radioactivity. Quick decontamination without exposing personnel seriously to radiation is not possible under the present circumstances and with present knowledge."[33]

This and similar statements show a reluctance to acknowledge the extent of the damage that had already occurred. Col. Warren's own statements, discussed above, document that the men were overexposed routinely and that they worked on ships which were 90% decontaminted were still very dangerously radioactive. Certainly, the knowledge of the Safety Section itself was much poorer right after Test Baker on July 25, 1946, than it was on August 7, 1946, when Col. Warren acknowledged the presence of widespread alpha contamination which could not be dealt with at all under the circumstances. Col. Warren's concerns about safety are evidenced in the fact that he recommended that the decontamination operations be shut down in a week. But extensive damage had likely already been done to large numbers of men who had been exposed to high levels of radioactivity in the course of their life and work in the weeks after Test Baker.

G. Instruments

> "The test turned out to be literally a hundred times larger than the original conception....We had to make decisions on instruments...at a time when the manufacturing program was non-existent... and we had to make essentially what could be made."[34]
>
> Col. S. L. Warren
> Chief, Radiological Safety Section

> "The 'experimental nature' of the instruments might be criticized as implying 'not proven' or known and hence possibly unsafe."[35]
>
> Capt. George M. Lyon
> Safety Advisor, Radiological Safety Section

The radiological danger to the personnel because of the nature of the tests, the haste with which it was conducted, and "the attitude of indifference" on the part of many officers was compounded by unsatisfactory and untested instruments. For some crucial radioactivity measurements, instruments were not available at all.

The X-263 was, for instance, one of the basic instruments at the disposal of the monitors. Little more than a month prior to the first test, Donald Collins discovered that only 1% of the crucial counter tubes in the second shipment were acceptable, compared to 90% in the first.

The instrument had not been field tested and performed poorly. Dr. William Myers who had been an enthusiastic participant in Operation Crossroads noted that the X-263 "too often failed to function entirely." When working, it "became very erratic and was often misleading on the 20X scale when it was essential that it function well." Finally, it "did not measure high enough radiation intensities."[36] The documents repeatedly record questions regarding the reliability of this instrument to accurately locate contaminated areas.

Even when it did work, it could only measure gamma radiation reliably. It did not measure alpha radiation at all. Its measurements of beta radiation were often unreliable.

The instrument thus provided some sketchy data about gamma radiation and much less about beta radiation. There were no field instruments at all to measure alpha radiation from substances such as plutonium. Karl Morgan and his team from Oak Ridge measured some air samples with filtration equipment to check for alpha radiation. However, this equipment did not work properly under the high temperature and humidity conditions at Bikini. It was therefore not used as a field instrument.[37]

Finally, almost all radiation measurements in the field related to external doses. There was no systematic measurement at Bikini for internal doses which personnel might get and continue getting for the rest of their lives by the inhalation, ingestion or absorption of fission products or alpha emitters like plutonium at Operation Crossroads.

Thus, every aspect of Operation Crossroads, especially after July 25, 1946, was fraught with danger for the 42,000 people present. The documents show that because of the indifference to safety, the lack of caution in spite of grave ignorance, and other factors, it is probable that large numbers of personnel were exposed to very high levels of radiation, particularly internal doses from fission products and plutonium, which continue to irradiate long after the Operation was declared closed and the target ships sunk.

References to Chapter III

1. Stafford L. Warren, Memorandum to Commander Task Group 1.2, USS Haven, 13 August 1946.

2. R. J. Buettner, "Safety Prediction - Test Baker," undated.

3. Director of Ship Material. *Radiological Decontamination of Target and Non-Target Vessels*, 3 vols., U.S. Navy, undated; vol. 1, p. 4.

4. U.S. Navy, *Report on Atomic Bomb Tests Able and Baker (Operation Crossroads)*. Washington, D.C., 15 November 1946; p. VII(C)(6).

5. cf. supra, #3; vol. 1, p. 25.

6. *Preliminary Report of Nuclear Radiation Effects in Tests Able and Baker*, From "013E" to "013," 25 September 1946; Appendix VII, Section E.

7. cf. supra, #4; p. VI(D)(41)

8. *Ibid*., p. VI(D)(21)

9. cf. supra, #2; p. 17.

10. cf. supra, #4; p. VI(D)(45)

11. cf. supra, #3; vol. 1, p. 18.

12. *Ibid*., vol. 1, p. 25.

13. cf. supra, #1.

14. Karl Z. Morgan, "Final Report on the Alpha, Beta, Gamma Survey Sec.," 6 August 1946.

15. Radiological Safety Monitors for Prinz Eugen, memorandum to Lt. Comdr. Wulfmann, "Subject: Radiological Conditions aboard the USS Prinz Eugen," USS Haven, 10 August 1946.

16. George M. Lyon, Memorandum to Admiral Parsons, Subject: "Ensign Coffin," 5 May 1947.

17. Medico-Legal Board, Minutes of 10 August 1946 meeting.

18. cf. supra, #4; p. VI(D)(44).

19. cf. supra, #6; Appendix VII, Section E.

20. cf. supra, #17.

21. Stafford L. Warren, Memorandum to the Commander Joint Task Force One, Subject: "Occupancy of Target Vessels as Influenced by Intensity of Radiation of Various Types on Target Vessels," 7 August 1946.

References to Chapter III - continued

22. cf. supra, #6; Appendix VII.

23. cf. supra, #7.

24. Ibid.

25. cf. supra, #1.

26. cf. supra, #21.

27. cf. supra, #14.

28. J.A. Garland and R.C. Chadwick, "Plutonium Suspension from Seawater," Health Physics, vol. 41, August, 1981, pp. 279-83.

29. Stafford L. Warren, Memorandum to Major Gen. L.R. Groves, Subject: "Clearance of 'Discussion on product contamination after underwater bomb detonation' during part of informal talks on safety at Bikini," 9 October 1946.

30. cf. supra, #3, vol. 3, p. 112.

31. Medico-Legal Board, "Appendix XX: Report of the Medico-Legal Board," 15 August 1946.

32. cf. supra, #21.

33. Ibid.

34. Stafford L. Warren, Letter to William G. Myers, 31 December 1946.

35. cf. supra, #16.

36. William G. Myers, Letter to Stafford L. Warren, 28 August 1946.

37. Karl Z. Morgan, personal communication, May 21, 1983.

Chapter IV

Radiation Standards

> In view of the experience with this whole subject [of radiation standards] in the past, it is my recommendation that no attempt be made to fix a range of tolerances for military operation....They would hardly be worth the paper they are printed on..."[1]
>
> Col. S. L. Warren
> Chief, Radiological Safety Section
> in January, 1947

An irradiation of the whole body at a rate of one-tenth of a roentgen per day (0.1R) was set as the "tolerance" dose above which a person would be considered "over-exposed for that day."* This limit was set in 1934[2] and was "the tolerance limit set up by the United States Bureau of Standards ...for manufacturing plants in the U.S."[3] It was based on a study of three technicians who were exposed to gamma radiation from radium at levels of exposure that did not produce immediately observable damage, mainly reddening of the skin. This "threshold" concept was similarly defined as the dose of radiation measured by the length of time it took for a given radiation flux to produce reddening of the skin.

Later the first dose limit for internal exposures was set in 1941 at 0.1 microcurie "Maximum Body Burden" of radium-226.[4] After the agonizing deaths of several radium dial painters in the United States, it was assumed that one ten-millionth of a curie of this internal alpha emitter was extremely dangerous. In other words, by 1946 and until 1949, the internal and external dose limits were mainly designed to protect people from tissue damage like erythema, anemia and acute forms of radiation damage and did not protect against chronic forms of damage such as carcinogenesis.

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*The annual limit was 30 roentgen.

At the outset, it might have seemed eminently reasonable to apply the "tolerance" limit for industries to atomic explosions. But as the days wore on, after the disastrous contamination which resulted from Test Baker, it became more and more clear that a gross mistake had been made, even if one granted the unwarranted presumption of adequacy to the industrial "tolerance" limits which were subsequently considerably reduced by the National Commission on Radiation Protection to 0.3 rem per week in 1949 and to 5 rem per year in 1957.

In industries, the locations and intensities of the primary sources of radiation are better known and fixed. Well-calibrated instruments can be used to better chart the radioactivity at various locations. Laboratories are available for analysis on site. Thus the wearing of film badges by personnel can be expected to give a fair indication of external whole body radiation once the film badges are developed and read. Even this is no assurance of adequate safety. For instance, the problem of internal intake of radioactive materials must still be addressed.

Conditions after an atomic explosion, particularly one such as Test Baker which contaminated and set in motion a vast quantity of radioactive water and spray, are entirely different. The location of the radioactive materials is unknown. There were no remote measuring instruments, so that monitors had to go into highly radioactive areas in order to get an indication of how radioactive the general area was.

Even once an area had been declared approachable for a certain time interval, using measurements from experimental and often faulty instruments, there was an immense and unpredictable variability in the radiation. The maximum radiation was, on some target ships such as Salt Lake City, fifty times the average and radiation levels could vary by a factor of one hundred within a short distance.[5]

Besides these differences in conditions, there was the widespread presence of beta and alpha radiation on the ships.

The Medico-Legal committee, recognizing this and the fact that beta radiation levels were often several times the gamma, adopted the following exposure standard one week after Test Baker:

> "The permissible dose of irradiation to the entire body will not be exceeded if the gamma irradiation is held below 0.1R per 24 hours. (This is on the basis of limit of 0.5R of beta per 24 hours)."[6]

Thus the permissible dose for external beta irradiation, which can seriously affect the skin, hands and all exposed parts of the body as well as certain soft tissues near the surface like lenses of the eyes, was set at five times the gamma level. Even this was on the presumption that beta radiation on the average was only five times the gamma. (The routine film badges which were issued to personnel measured only gamma radiation.) In practice the ratio of beta to gamma radiation was extremely variable and could reach one hundred or more. Karl Morgan measured one beta radiation level six hundred times the gamma.[7] Thus a standard for beta radiation based on gamma readiation measurements was inherently defective. It was in this regard that Col. Warren noted:

> "Practices which can be applied with safety in industrial plants through long time supervised training and guidance cannot be employed with safety in the attack on the present problem...."[8]

If the situation regarding external radiation standards was highly unsatisfactory, internal irradiation, including alpha emitters, was much worse. In fact, the documents we have examined indicate there were no formal standards for alpha emitters at all, and no operable field instruments to measure alpha radiation. Tolerances, based on the Manhattan Project, were discussed, and the doses implicit in these were very high indeed.

In a memo to Col. Warren, R. R. Coveyou (one of seven surveyors brought in by Karl Morgan from Oak Ridge National Lab), presented sample calculations showing how much plutonium sailors would inhale if the surfaces being worked on were contaminated up to a suggested tolerance level.[9] Using current methods of calculation, we estimate that one of the highest cases cited would amount to a one to nine rem to the bone surface per four hours working shift.[*][10] Thus for a twenty-day working month, the dose would be enormous: 20 to 180 rem. A few days prior to Test Baker, the Medico-Legal Board had raised the "question as to the actual danger to CROSSROADS personnel from plutonium dispersed by the Baker nuclear explosion...."[11] but thought the problem manageable and the plan of the Radiological Safety Section to be "adequate" even in the worst situation.

In actual practice, the Radiological Safety Section had no plan to deal with plutonium or other alpha emitters as such. It had presumed that gamma radiation measurements would be adequate to the job and paid no specific attention, as far as can be discerned from the documents, to "the most poisonous chemical known."

Two weeks after Test Baker, it had become evident that alpha radiation was a serious hazard which was "extensive and unpredictable," the more so as no field instruments were available to measure it.

---

[*] This would be the total internal dose to the bone surface, over a lifetime, resulting from a four-hour shift.

The problem of measuring the extent of a ship's alpha contamination turned out to be insurmountable even after samples of materials from contaminated ships were sent to laboratories. Dr. Herbert Scoville commented on the measurements obtained from samples from a non-target ship:

> "The total [alpha] contamination on the ship is estimated to be about 2000 micrograms, but this value may be in considerable error due to different degrees of contamination in various locations and the difficulty of averaging the various readings in order to obtain the total contamination on the ship...."[12]

Since there was no satisfactory way to address the problem of alpha measurements and standards directly for unpredictably contaminated ships, the problem of standards for exposure became a much more difficult one. According to the Decontamination Report:

> "....The revelation of the presence of alpha emitters with the fission products, the lack of instruments for detecting alpha emitters and the absence of standards for safe exposure to them, had introduced an indeterminate factor in all deliberations as to radiological safety. Consequently.... 0.01R/day... was selected as the arbitrary external radiation intensity below which all salt water systems should be reduced for clearance of active ships."[8]

Thus, the military decided on an "arbitrary external radiation intensity" ten times lower than the previous standard of 0.1R/day in part to compensate for an inherently unpredictable distribution of plutonium and in part to account for the much more rapid decay of gamma radiation sources compared to alpha emitters.

Precisely because it was an arbitrary standard, the military found that "no radiologists of recognized authority were ready to declare the figure safe until a study had been made of all the factors involved."[13]

The situation proved so intractable and dangerous that the standard was once again lowered tenfold:

> "...it was ruled that final clearance maximum allowable readings for all ships would be .001R/day gamma for shielded readings and .005R/day combined gamma and beta for exposed surfaces pending further developments."[14]

Even so, there was no assurance that someone would not ingest a deadly amount of plutonium.

References to Chapter IV

1. Stafford L. Warren, Memorandum to Admiral W.S. Parsons, Subject: "Wartime Radiation Tolerances," 18 January 1947.

2. Radium Protection for Amounts up to 300 Milligrams, U.S. Bureau of Standards Handbook #18, 17 March 1934.

3. Stafford L. Warren, Summary of Lecture on Safety to Monitors, 31 May 1946.

4. Safe Handling of Radioactive Luminous Compounds, Handbook of the National Bureau of Standards H-27, May 2, 1941.

5. Preliminary Report of Nuclear Radiation Effects in Tests Able and Baker, from "013E" to "013," 25 September 1946; Appendix VII.

6. Medico-Legal Board, Minutes of meetings on 2-3 August; 3 August 1946.

7. Karl Z. Morgan, personal communication, May 21, 1983.

8. Stafford L. Warren, Memorandum to Commander Joint Task Force One, Subject: "Occupancy of Target Vessels as Influenced by the Intensity of Radiation of Various Types of Target Vessels," 7 August 1946.

9. R.R. Coveyou, Memorandum to S.L. Warren, Subject: "Gamma-Alpha Equivalence for Flat Surfaces," 26 August 1946.

10. K.F. Eckerman, et al., "Internal Dosimetry Data and Methods -- Part 2, vol. 1: Committed Dose Equivalent and Secondary Limits," NUREG/CR-1962, vol. 1, February 1981.

11. Medico-Legal Board, "Report of the Medico-Legal Board on Plutonium Hazard Associated with Test Baker," 22 July 1946.

12. Herbert Scoville, Letter to Captain G.M. Lyon, Subject: "Comments on Results of the Investigations on the USS ROCKBRIDGE," 21 November 1946.

13. Director of Ship Material. Radiological Decontamination of Target and Non-Target Vessels, 3 vols., U.S. Navy, undated; vol. 1, p. 41.

14. Ibid.

Chapter V

Operation CROSSROADS and the Defense Nuclear Agency

"The potential for such [alpha] exposure at CROSSROADS was very low."[1]

Defense Nuclear Agency

"Compared to other tests, exposures for CROSSROADS are relatively low."[2]

U.S. Navy

In numerous Veterans Administration cases brought by CROSSROADS veterans, the Defense Nuclear Agency has maintained that radiation doses, both internal and external, were low. In its dose assessments, the Agency assumes that the radiological guidelines were obeyed, that the standards were adequate, and that the radiation monitoring equipment worked well. Using these assumptions, the Defense Nuclear Agency arrives at its conclusion that the doses were low for specific veterans, without systematically taking into account what that particular veteran did during and after the test.

The official records of Operation CROSSROADS show that the Defense Nuclear Agency's assumptions are without foundation in fact -- which renders its conclusions about doses unscientific. The Joint Task Force had not made any plans for decontamination. Nor did anyone know how to decontaminate a ship. The radiation standards were several times today's levels for external gamma and beta radiation. There were no official standards for alpha radiation or internal doses, so far as can be determined. Many of the instruments did not work well -- and most of them were experimental ones made in great haste. There were no field instruments at all for alpha radiation -- and eventually it turned out to be impossible to estimate the actual extent of the alpha contamination of the ships. All that could be determined was that it was "extensive and unpredictable."

The Defense Nuclear Agency has dismissed the internal dose as "essentially insignificant."[3] Yet Col. Warren, as noted above, the Chief of the Radiological Safety Section of Operation CROSSROADS, stated that "no one can say any place is safe for any length of time" because "any surface of any vessel may be in fact the residence of many lethal doses of this alpha emitter." Since the men were sweeping, scrubbing, hosing down and even sleeping on heavily contaminated ships, the Defense Nuclear Agency's outright claim must be dismissed as baseless. Indeed, the circumstances make it likely that a great many men absorbed significant amounts of alpha emitters which continue to irradiate the portions of their bodies where they are incorporated.

These comments about alpha emitters also apply to internal doses from fission products. In addition, the Radiological Safety Section found that external overexposures to hands were "exceedingly common" and that very high doses bordering on erythema were "not infrequent."

In its calculations of beta radiation dose, the Defense Nuclear Agency has further claimed that the beta and gamma radiation levels were approximately equal.[4] In contrast, the documents show that beta radiation levels averaged ten times the gamma levels and reached up to one hundred times in certain areas.[5]

The presence of radiological "hot spots," many of which were unknown, make it likely that many men received high doses merely by lingering in such areas. In general, the unpredictable and ill-defined nature of the contamination make it essential that a detailed knowledge of each specific veteran's activities be used as basic data in estimating possible doses. Even so, the lack of adequate and systematic knowledge of the radiological conditions make it unlikely that any definitive statements can be made about specific persons who were present at Operation CROSSROADS for any length of time.

The "hairy-chested" "attitude of indifference" to radiological matters contributed largely to the dangers to which the personnel were subjected. Such attitudes contributed to extensive violations of radiological guidelines (not wearing protective clothing like gloves, for instance) -- in direct contrast to the assumptions of the Defense Nuclear Agency.

The information in the documents does not allow us to make even rough estimates of exposures. But it does allow us to dismiss as unwarranted any sweeping claims that the doses were "low" or "essentially insignificant" -- particularly as the Defense Nuclear Agency has made such claims without systematic reference to the veterans' detailed accounts of their own activities -- data we consider essential to any serious judgment on the matter.

References to Chapter V

1. U.S. Navy, "History of New York at Crossroads," undated.

2. Enclosure to letter by Capt. W.H. Loeffler, U.S. Navy to Veterans Administration, entitled: "History of USS Salt Lake City (CA-25) During Operation Crossroads (1946)," 17 August 1982.

3. Defense Nuclear Agency, "Fact Sheet, Subject: Nuclear Test Personnel Review (NTPR)," Washington, D.C., 1 March 1982.

4. Capt. W.H. Loeffler, U.S. Navy, Letter to National Veterans Law Center, 14 June 1982.

5. Preliminary Report of Nuclear Radiation Effects in Tests Able and Baker, from "013E" to "013," 25 September 1946; Appendix VII, para. E-7.

[redacted]

UNIVERSITY OF CALIFORNIA

RADIATION LABORATORY
BERKELEY 4, CALIFORNIA

CROSSROADS I

26 August 1946

Classification changed to [illegible]
by authority of CG-UF-2 2-2 ID
James T. Davis [illegible]
SAN Classification Officer

To: Colonel Stafford L. Warren
Building 2001- 14th and Ferry Streets

From: Kenneth G. Scott
Crocker Radiation Laboratory

SUBJECT: Monitoring of the Kenneth Whiting

Auxilliary condensers of the Kenneth Whiting were monitored for radioactivity and were found to contain, on 26 August 1946, the following activities:

1. 100 milli roentgens per day
2. 200 milli roentgens per day
3. 100 milli roentgens per day

The above are gamma activities. The main condenser was found to be inactive.

The evaporators on the same ship were checked:

1. Evaporator - 50 milli roentgens per day
2. Evaporator - 100 milli roentgens per day

(or β
.250 R
.500 R)

Small ports on both evaporators were removed and the beta activity of the interior was five times more active than the gamma fraction previously mentioned. Samples of scale from the evaporators were obtained and plutonium assays will be performed on them.

The small boat engines aboard the Kenneth Whiting were not active.

The condensers for the ice machines were found to give 50 milli roentgens per day of gamma activity.

The ship's engineer expressed a desire to overhaul the evaporators of the ship while it is at San Diego. In view of the rather high order of gamma and beta activities, I suggested that a monitor be present in order to adequately protect the workmen and advised him to request such a monitor from you.

Kenneth G. Scott

[illegible] G. Hamilton ✓
File

[redacted]

[redacted]

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, DC 20350

IN REPLY REFER TO
981T3FD/2008
AUG 15 1983

Mr. Fred C. Thompson
2417 Beacon Hill Road
Alexandria, Virginia 22306

Dear Mr. Thompson:

This is in reference to your previous contact with the Defense Nuclear Agency (DNA) or our office regarding your participation in the atmospheric nuclear test program the United States Government carried out from 1945 to 1962.

An earlier letter indicated the Department of Defense (DoD) was undertaking a major research effort to determine the involvement of DoD personnel in these tests, and that as information was developed it would be provided to you. This effort has been actively ongoing since 1978 in your behalf, and it is now nearing completion. The purpose of this letter is to provide you with the status of the Nuclear Test Personnel Review (NTPR) program, a summary of the test series in which you participated, and a current report on the radiation exposure you received.

The overall program is described in the enclosed NTPR Fact Sheet. You will note that substantial progress has been made in reconstructing participant rosters, documenting the activities of participating personnel in a series of historical volumes, and determining radiation exposures that were received. In addition, the National Academy of Sciences is conducting a health experience survey that will involve a large portion of the DoD participants in order to ascertain if there may be increased mortality due to any specific diseases among the participants, and if so, whether it may be related to radiation received at the testing. The final results of this health survey will not be available until 1984, but upon completion their findings will be widely reported.

An important finding to date is that radiation exposures to the participants were generally quite low. The average exposure to an individual was less than half a rem. (A rem is a unit of biological dose of radiation which takes into account the effect on body tissue.) Many individuals received recorded exposures of zero. Our research also indicates that less than one percent of the nuclear test participants exceeded the current Federal guideline of 5 rem annual exposure, and these individuals have been, or are being, notified directly. The consensus of the medical and scientific community is that the risk of any adverse health effect from exposures such as experienced by nearly all test participants is very, very slight.

The test series in which you participated is summarized in the enclosed series fact sheet(s). A more detailed description of the particular series has been prepared in book form and is being distributed to over 700 libraries and Federal offices, including Veterans Administration Regional Offices. These volumes have been written and distributed to help participants better understand the test or tests in which they were involved. A listing of the facilities that are receiving copies of all the atmospheric nuclear test historical volumes prepared by DNA is included. Copies of these publications may also be purchased through the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161.

The enclosed Atmospheric Nuclear Test Participant summary sheet has been prepared for you. It lists all the tests for which documentary evidence indicates you were assigned to a participating organization. The "Total Recorded Exposure" entry on this sheet is a total of all recorded doses for gamma radiation for all test periods. In cases where no badges were issued, a calculated dose for you has been assigned based upon scientific reconstruction of your unit's activity or analysis of badge readings for your unit. A "Total Calculated Exposure" is also listed. Individual exposures for dosimetry badges assigned to you or for each calculated dose are then summarized below. Since the Total Recorded or Calculated Exposure entries may cover more than a one-year period, they could be higher than 5 rem and yet not exceed the Federal guideline of 5 rem for any 12-consecutive-month period. The information contained in this letter is a compilation of the data that is available from many sources about your case following more than three years of intensive research.

Since film badges were not issued for the entire CROSSROADS period, a scientific dose calculation of the most probable exposure has been made. This exposure covers the period from the first test on July 1 until the ship's return to the United States or when it received its operational radiological clearance, whichever occurred later. The calculated dose includes low-level radiation exposure from living aboard ships, exposure levels when the ships were alongside target vessels or when it is known the crew boarded target vessels, a contribution from the low-level radiation from Bikini Lagoon water, and a dose contribution while in transit back to the United States. This calculation is in addition to any film badges that may have been issued.

Should you believe you have a service-connected medical condition, you may file a claim for benefits or compensation with the Veterans Administration (VA). Information can be obtained from your VA Regional Office. The question of service-connected disability or compensation cannot be resolved by the U.S. Navy. Such a decision is, by law, the exclusive domain of the Veterans Administration; however, the Navy NTPR Office will assist you in every possible way.

I hope this information has been of value to you in assessing your specific involvement in the atmospheric nuclear test program. It should be reassuring to you that in the vast majority of cases there is virtually no probability that test participation might cause any adverse health effects.

We appreciate the information you previously provided, and your participation in the NTPR program. I wish to extend the Navy's sincerest thanks to you for your dedicated service to our country. The Veterans Administration is your normal point of contact for further inquiries, but if we can be of further help, please do not hesitate to contact us.

Sincerely,

W. H. Loeffler

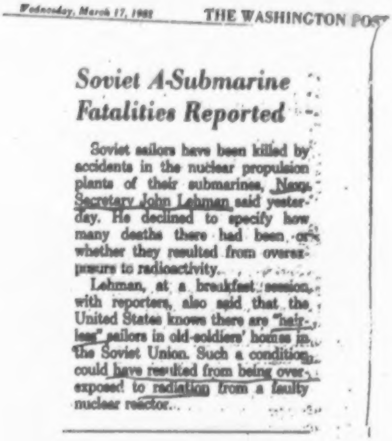
Captain W. H. Loeffler, USN
Navy Nuclear Test Personnel Review
Room 756, Commonwealth Building
1300 Wilson Boulevard
Arlington, Virginia 22209

Enclosures:
DNA NTPR Fact Sheet(s)
Test Series Fact Sheet(s)
NTPR Library List
Atmospheric Nuclear Test Participation Summary Sheet
NTIS Price List for Historical Volumes

```
                 ATMOSPHERIC NUCLEAR TEST PARTICIPANT

NAME: THOMPSON        FRED     COLEMAN   RANK: WT2  SERVICE: USN

NSN: 00256504300  TOTAL RECORDED EXPOSURE:          REM GAMMA
SSN: 520200315  TOTAL CALCULATED EXPOSURE:    0.322 REM GAMMA

ATTACH UNIT       UNIT                                SERIES
 YEAR  NUMBER     NAME                                NAME

 1946  AV14       KENNETH WHITING                     CROSSROADS

            SUMMARY OF INDIVIDUAL RADIATION EXPOSURE DOSES

                   BEGINNING  ENDING
           EXPOSURE EXPOSURE  EXPOSURE  GAMMA
             YEAR   DATE      DATE      (REM)
                    YY/MM/DD  YY/MM/DD

             1946   46/07/01  46/12/11    0.322 CALCULATED
```

This is a bunch of lies, mingled with bull shit. What they are saying is that good old American Radiation wont hurt anyone. After 40 yrs, They would have you believe, That they can reconstruct ones dosage with out even finding out the duties that each seaman performed They also have my Rate wrong. I was a Electronic Technician 2nd Class, They have me listed as a Water Tender 2nd Class. Another example of Navy "Well Done".

A-3



Wednesday, March 17, 1982 THE WASHINGTON POST

Soviet A-Submarine Fatalities Reported

Soviet sailors have been killed by accidents in the nuclear propulsion plants of their submarines, Navy Secretary John Lehman said yesterday. He declined to specify how many deaths there had been or whether they resulted from overexposure to radioactivity.

Lehman, at a breakfast session with reporters, also said that the United States knows there are "hairless" sailors in old-soldiers' homes in the Soviet Union. Such a condition could have resulted from being overexposed to radiation from a faulty nuclear reactor.

Here is another example of the Navy's way of thinking. Here Sec. Lehman says that "Russian" radiation is not only dangerous but fatal as well. "American" radiation the Navy, D.N.A. and V.A. say is inconsequential.

Note, too, the Russian Gov't has provided "old soldiers homes" the American Gov't, on the other hand, denies that anyone ever got any radiation, so of course no homes are needed.

POTOMAC NEWS, Woodbridge, Va., Wednesday, Nov 28, 1984.

For atomic veterans, time for help is running out

NORMAN TENNANT

Some day I'm going to D.C. and take my time looking at the Vietnam War Memorial. It sounds like a fine, appropriate memorial, fifty-some thousand names of people who died in the war, being pondered by the frozen ghosts of three of them.

But I'll listen as I walk along the wall. I may hear other ghosts, older ones without a wall of their own, and of some who hurt away the days waiting to join them. Vietnam wasn't the first time we cruelly used our sons, then left them twisting in the winds of indifference. The Agent Orange controversy is approaching a conclusion; the atomic veteran one may never, until they all die from it.

I know a guy, Fred, who was a sailor in the Second World War. He served in the South Pacific, first on a carrier then on a seaplane tender. After the war, his ship was sent to Bikini, for Operation Crossroads, a series of atomic bomb tests. They watched the first shot, in mid-air, from six miles out, then "four hours later we were anchored back in the lagoon with no regard for radiation. Our evaporators made fresh water from the contaminated water which we used for bathing, drinking, cooking and sanitation."

The second shot was even worse. It was underwater and it showered the lagoon and the fleet with radioactive debris. Stanford Warren, medical advisor to the radiological section of Operation Crossroads, warned that "Contamination of personnel, clothing, hands, even food, can be demonstrated readily in every ship in the fleet in increasing amounts, day-by-day."

Fred came out with several unexplained red spots, which he still has. He also has pain, constant in every joint, and the knowledge that he will, like a lot of others who served with him, probably die five to ten years sooner than he should. He's 58, with a cool head and smart hands, and with a short and hurting future and the government refuses to admit that anyone over there got enough radiation to hurt them.

An estimated one million Americans have been exposed to radiation fallout from atomic tests between 1945 and 1980. The government has denied liability, arguing that none of them was exposed to high enough doses of radiation to cause cancer.

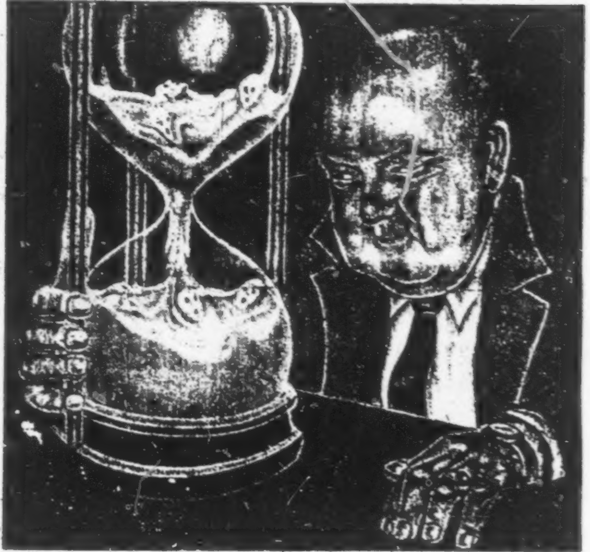
But they are hurting, and dying early. Veterans are prohibited by a 1950 Supreme Court ruling from suing the government for war wounds, and now there's a law preventing such suits against government contractors, the only source of satisfaction left. More than 3,000 veterans have filed disability claims associated with radioactive fallout. All but 17 have been denied.

A couple of outfits are trying to get people like Fred some attention. The National Association of Atomic Veterans have been pecking away for years, but in the face of indifference by the agencies that are supposed to help, it's heavy going. We don't want to think about radiation diseases. It forces us to think about the hazard under which we all live. Give us a good clean gunshot wound or a paraplegic with a handsome face. The wounded of the atomic age are the modern-day lepers. Keep them out of sight until they decently die. Then we can blow taps over them once a year and avoid the hard questions.

The questions are by now, mostly irrelevant. Forty years later, it is scant comfort to know who struck John. What is needed are pensions and medical treatment, and the recognition that these people are not goldbrickers and gripers, but wounded veterans who got that way by following orders.

I can understand how a science so new could bruise the people trying to tame it. None of us knew much about it then. And fighting men have been hurt and killed by unknowing orders before. But before, they were treated like wounded vets should be, with government care and compensation. Here the wounds don't show, and the wounded hurt and die, and nobody cares but them and the people who love them.

BUREAUCRAT



By John Brand—Special to the Potomac News

We've had a lot of wars, and we have a lot of people hurting from them, more than there's room for on a memorial. It seems cruel that we can't spare some caring for those who met our fiercest beast and came back poisoned from the meeting. We'd stand a little taller as a country if we cared for all of our wounded.

Norman Tennant, a Woodbridge resident and technical writer, comments on our community.

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December 5, 1985

Senator Alan Cranston
Veterans Affairs Committee
U.S. Senate
Washington DC 20510

RE: GAO Study of Crossroads Veterans

Dear Senator Cranston,

Our organization represents a number of atomic veterans in claims now pending before the Veterans Administration. Today we saw a brief NBC-TV report that the GAO had confirmed the Makhijani and Albright testimony to your Committee as to exposure to servicemen at Operation Crossroads.

I am concerned that the bottom line at this stage is a call for more studies. True, more studies, particularly by the Center for Disease Control, rather than the Defense Nuclear Agency, would be helpful. But the majority of those suffering from the latent effects of Operation Crossroads cannot wait for more studies. They need veterans benefits.

John Smitherman fought fires aboard a burning aircraft carrier at Crossroads and was involved in decontamination efforts. He died of lymphedema, colon cancer and lung cancer in 1983. His widow and orphans are destitute. They have been denied veterans benefits seven times.

Mike Stanco reboarded the USS Nevada 48 hours after shot Able and worked to decontaminate it for 24 days before shot Baker. He died of leukemia and colon cancer last month. His first child has cancer. His second has serious birth defects. The VA has turned down his claims for benefits repeatedly.

Herbert Scoville, whom you may know, died last summer of colon cancer. He was a scientific advisor at Crossroads and boarded target vessels to study contamination effects.

Jim Dugan was a naval photographer at Crossroads. He took many of the pictures that are commonly used to show the events of 1946 even today. He is nearly completely paralized with an unknown CNS degenerative disorder. He can move his eyeballs and one finger--that's all.

These people--or any of the 17,000 most at risk--won't be helped by more studies. Crossroads veterans most need financial aid and the legislated recognition that their mutagenic disorders are probably service-connected.

Please do what you can to assist these people at once.

Sincerely yours,

Albert Bates
Director

NATIONAL COMMITTEE FOR RADIATION VICTIMS

December 20, 1985

Written material by Dr. Arjun Makhijani submitted for the record of the hearings on December 11, 1985 before the Senate Committee on Veterans' Affairs as a supplement to the written testimony of Dr. Makhijani which was submitted on the day of the hearing. It is also being submitted as a supplement to questions raised relative to the testimony of Fred Thompson of the National Association of Radiation Survivors.

In particular this submission addresses the matter of radioactivity found on the evaporators and condensers aboard the Kenneth Whiting, a non-target ship at Operation Crossroads.

On December 11, 1985, Fred Thompson of the National Association of Radiation Survivors submitted for the record a memorandum dated 26 August 1946 from Kenneth G. Scott of the Crocker Radiation Laboratory to Colonel Stafford L. Warren who was Chief of the Radiological Safety Section at Operation Crossroads.

In the memorandum Kenneth Scott reported that the evaporators and auxiliary condensors on the Kenneth Whiting were radioactive, measuring up to 200 milliroentgens per day of gamma radiation. Sample interior surfaces showed five times more beta radiation than gamma.

This revelation is of great significance for the veterans of Crossroads. The evaporators on a ship evaporate the salt water from the sea. The steam, which is free of salt, is condensed and used as potable water. Contamination in the condensers means that the water used by the crews for drinking, cooking, bathing, washing-up, and even cleaning wounds was probably contaminated.

The contamination of upto 1 roentgen per day of beta radiation of the internal surfaces reported in the memo is quite high. It is, however, not possible to determine the level of contamination of the potable water from this because we do not have information on the specific elements and the chemical form in which they were present. There is also likely to have been a considerable variation in the levels of radioactivity from day to day during the initial period, depending on where and if the ship was anchored. Thus, the main condensors aboard the Kenneth Whiting "were found to be inactive" -- probably referring to a lack of radioactivity (which was often referred to as "activity"). It is thus likely that the auxiliary condensers were the ones that were most used when the Kenneth Whiting was anchored in the heavily contminated Bikini lagoon.

The memorandum also states that samples taken from evaporators were to be tested for the presence of plutonium. It would be helpful if the results of these and all other tests on evaporators and condensers for beta and alpha contamination could be made available to the public. This data should include information on the sensitivity of the tests and instruments used.

The revelation of the contamination in some of the condensers of non-target ships at Operation Crossroads is of great significance to atomic veterans. Heretofore, it has been assumed that the personnel at greatest risk were those associated with work on target ships.

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- According to the GAO report these number about 17,000 of the total of 42,000 personnel at Crossroads. Of course, duty on the target ships was very hazardous, given the extent and unpredictability of the contamination, particularly for internal irradiation due to inhalation, ingestion, or contamination of wounds. Now, it seems that personnel aboard the non-target ships may have been routinely consuming radioactive water and washing up with it. The Defense Nuclear Agency has neither taken this into account, nor even acknowledged the possibility of internal ingestion on non-target vessels.

This matter again points up the need to grant presumptive relief to the atomic veterans. It also supports the NCRV's other recommendation - that further studies be done by institutions other than the Departments of Defense and Energy, and their contractors.

Senator CRANSTON. Colonel Caldwell.

STATEMENT OF LT. COL. BOLEY CALDWELL, U.S. ARMY (RET.), AN OPERATION CROSSROADS PARTICIPANT AND MEMBER OF THE NATIONAL ASSOCIATION OF ATOMIC VETERANS, DALLAS, TX

Colonel CALDWELL. Thank you, Senator.

I have been interested ever since I came in here this morning concerning the comments which people have made concerning photographs or movie film or data or various items of interest to the committee. I would like to say that, at the time of Crossroads 40 years ago, I was an 18-year-old enlisted Army Corps of Engineers technician at Los Alamos Laboratories, a part of the Manhattan project. I was sent to Bikini to be trained as a radiological safety monitor. I received about a month's training, technical training. It actually lasted 2 weeks, with another 2 weeks devoted to practical training. We had to learn how ships were constructed. I was assigned to Initial Boarding Team 10. The initial boarding teams were the third wave in after each explosion on the Able and Baker.

That will give you some idea of my background. I was aboard somewhere above 50 target ships. I was at Bikini not only for Able day and Baker day, but when everybody bugged out and went home and took all the high-class scientific brains with them, I was one of the ones with Dr. David Bradley that were left without a book or regulations to fend for ourselves. And because I wore Navy fatigues and other types of uniforms off duty—we had very little uniform regulation on the *Haven*—it did not matter whether I was a sergeant or whether I was a lieutenant or whether I was a lieutenant commander or whether I was a civilian, if you were a radiological safety monitor on working parties, people paid attention to you. If you decided to leave a target ship, they left with you. They did not argue with you. They did not ask for a scientific study. If it was dangerous, they left with you. We blew the whistle, they left.

My point is that in that picture of the U.S.S. *Hughes*, that you have been trying to determine, Senator, what date it was on and all that, it really does not matter. The main point with that picture is that the man with the welding torch in his hand was a RADSAF monitor. He has on a rebreather apparatus, he has on the coveralls and the gloves. We did not have rubber boots. We did not have disposable protective clothing of the type used today. It was after the change ship, the APL-27, arrived at Kwajalein that they instituted booties by using Government-issue sandbags, for foot-and-boot protection. We managed to track an awful lot of radioactivity on to the support ships.

Senator CRANSTON. What date did you get to Kwajalein?

Colonel CALDWELL. What date did I get to Kwajalein?

Senator CRANSTON. Yes.

Colonel CALDWELL. The specific date is in my statement, sir. It was around August 26 or 27, 1946, sir.

Senator CRANSTON. Thank you.

Colonel CALDWELL. It is when the *Haven* moved to Kwajalein that I went on the *Haven*.

I was at Able test for 2½ days——

Senator CRANSTON. July?

Colonel CALDWELL. Of July, 1 to 3 July, I was on the *Suncock* in a boarding team, and Baker test I was on the *Suncock* approximately 17 or 18 days, sir, according to my statement.

We had no decontamination procedures or facilities on AN-80, the *Suncock*, except for the shower, the crew shower, and that was saltwater. Protection of boarding parties for decontamination were the responsibility of the senior monitor. There were two monitors on each boarding party team, an Army doctor—in my case, Dr. Tebbet—and myself. And we were responsible to see that the troops' hands and heads and all were not contaminated after they came off the ship.

We were issued coveralls as protective clothing on the boarding teams. Each member of the boarding team, and there were approximately 10 persons in each boarding team, two of which were monitors, all of us were issued Chemical Corps impregnated coveralls which had been produced for poison gas during World War II, as was the survey instrument that we used, the X-247 was designed and developed for the invasion of Europe when they thought that the Germans might obtain the atomic bomb before us.

I would like to make one final comment, since I see the light has come on. In my own dose reconstruction, which started in 1978, DOE indicated I had 0.270 Rem and 0.500 RAD, gamma and beta exposure respectively. In July 1984, after joining NAAV, I resubmitted a request, and DNA sent me their standard printout, which indicated I had received about 1.4 Rem gamma and about 0.530 RAD beta.

I then wrote again, and DNA did a detailed study for me, and my present dosage that they indicate I have is 2.788 Rem gamma and 0.530 RAD beta. This represents an increase of about 1,000 percent over the initial dosage that the DOE and DNA indicated that I had received at Crossroads.

It is like Dr. Bradley said. We were a military organization. As I said in my statement, we were not there to gather data. The basic tool that we used as monitors was our dosimeter. It was our real-time indicator that indicated to us, this is how much gamma radiation you have been exposed to as of now.

I had two dosimeters. One was my personal dosimeter that I kept my personal dosage on; the other was what I used to gauge the boarding teams dosage, because you must remember, we went from ship to ship, and one-tenth of an R (0.1R) was our daily dose. We had to keep a log of each ship, keep up with the amount of radiation absorbed on each ship and when the team as a whole reached the tenth of an R tolerance, we shut down for the day.

As I remember, during the some 90 days that I was there, anytime we were out on a targetship after Baker day, I operated very close to the tolerance of 0.1R/24 hours. And if you figure about 60 days of duty during that time, it would put my total close, around six roentgens gamma, which is a significant exposure to gamma. And if you use the gamma to beta ratio of 1 to 5, I received about 30 beta, and that is a significant exposure.

I thank you. I will be happy to answer any questions you may have for me.

Senator CRANSTON. Thank you, Colonel, very much.

[The prepared statement of Colonel Caldwell follows:]

NATIONAL ASSOCIATION of ATOMIC VETERANS
P. O. Box 707, Eldon, Missouri 65026
314/392-3361

Reconstruction Coordinator
Boley H. Caldwell III
LTC(Ret) U.S.Army

December 6, 1985

LTC(Ret) Boley H. Caldwell III
2310 Apollo Way
Mesquite, Texas 75150

The Honorable Alan Cranston
Hart Building #112
Washington, D.C. 20510

Dear Senator Cranston,

At the direction of Lucius Smith III, Adjutant General of the National Association of Atomic Veterans, I am enclosing a signed statement of my proposed testimony to be given before the Veterans Affairs Committee of the Senate on December 11, 1985, in room #414 of the Russell Building, Washington, D.C. A summary of my background is attached.

I have taken the liberty of enclosing a summary sheet showing the manner in which the Department of Energy and the Defense Nuclear Agency have released my "Total Dose" values over the years. Additionally, I have enclosed a copy of my Reconstructed (Caculated) Dose for Operation Crossroads as presently stated by the Navy, Nuclear Test Personnel Review Board, DoD.

As a citizen and a former member of the Radiological Safety Section of Joint Task Force - One, I consider it an honor and a privilege to appear before your committee to testify concerning Operations Crossroads.

I remain,

Sincerely,

Boley H. Caldwell III
LTC(Ret) U.S. Army

4 Enclosures.

Statement
to
Senate Veterans Affairs Committee

Hearing on "Operation Crossroads"
Scheduled for 11 December 1985

INTRODUCTION:

Operation Crossroads, the first atmospheric testing of atomic weapons by the United States, was conducted during the months of July & August 1946 for the primary purpose of determining the effects of an atomic weapon upon naval vessels. The tests were a joint armed services operation conducted under the command of Joint Task Force - One (JTF-1). Two devices were detonated during Crossroads, the first (Test Able) on 1 July 1946, the second (Test Baker) on 25 July 1946. A third test (Test Charlie) was scheduled as a deep underwater test but was later cancelled. The yields of these weapons have been reported in various documents by the U.S. government at levels ranging from 17 KT to 23 KT. The Test Able weapon was a gun type Uranium device which was dropped from a B-29 aircraft and was detonated at an altitude of 520 feet. The Test Baker weapon was an emplosion type Plutonium device suspended by cables under the LSM-60 to a depth of 90 feet. For both tests ninety target vessels were positioned around ground zero at varying distances out to just over two (2) nautical miles.

Operation Crossroads evolved into four (4) seperate phases; "Test Able", "Test Baker", the "Stabilization Period", and the "Post Baker Operations". The Stabilization Period was further divided into two additional phases. The Movement Phase and the Ammunition Removal Phase.

For all practical purposes Test ABLE was completed in three days (1-3 July 1946). Test BAKER lasted for seventeen (17) days (25 July - 10 August 1946) and was terminated by the Director of Ships Material (DSM) when senior Naval officers realized that they had serious decontamination problems with the vast majority of the target vessels.

The Stabilization Period lasted for sixty - one (61) days (11 August - 10 October 1946) and was terminated with the departure of the USS Haven and the majority of the original JTF-1 Radiological Safety Section. Radiological Safety from this point onward was purely a Navy problem rather than a Joint services responsibility.

The Movement Phase began about 15 August and lasted into the third week of September and overlapped into the Ammunition Phase which began on 4 September 1946. The prime purpose of the Stabilization Period was to evacuate all target vessels, support vessels and all personnel from the highly contaminated Bikini Lagoon to Kwajalein Lagoon where the unmanned target vessels could be maintained and have the unstable ammunition removed and disposed of in a more radiologically safe environment. Both were necessary safety requirements. Additionally, these actions provided time for the Navy Department to study decontamination requirements in order to arrive at a decision concerning target vessle disposition.

The Post Baker phase lasted into 1951 when the last target vessel was sunk. Of the 83 target ships involved in the tests, 16 were sunk immediatly by the two detonations, 9 were either sold for scrap or transferred to the Maritime Commission, and the remaining 59 had to be sunk because of the residual radiocative contamination.

Joint Task Force - One was terminated on 1 November 1946. Followup actions to complete the operation were accomplished by the " Joint Crossroads Committee" of the Joint Chief's of Staff.

GENERAL COMMENTS:

During Crossroads, I was an 18 year old Army enlisted technician who was brought out to Bikini from the Manhattan Project at Los Alamos, New Mexico, to function as a Radiological Safety Monitor in the Radiological Safety Section of JTF-1. I was given approximately four weeks of formal training prior to my first assignment during Test Able. During both Able and

Enclosure E-1

Baker tests, I was assigned as one of two RAD-SAF Monitors to Initial Boarding Team #10. The team operated off of the USS Suncock AN-80 a Navy submarine net tender. During the Stablization Period, I was assigned to Diving and Salvage Tugs to provide radiological monitoring protection to divers who were diving on sunken target vessels, and I also functioned as a general monitor accompanying working parties onto target vessels. I worked as a general monitor accompanying both ammunition removal parties and boarding parties during the Ammunition Removal phase. From time to time during this entire period I performed other RAD-SAF duties such as urine collection and counting, film badge reading and recording and general radiological surveys. I departed the USS Haven and the Radiological Safety Section on 3 October 1946 to return to the Manhattan Project.

In my later military career as a commissioned officer I was trained and performed duties in Nuclear Weapons assembly, inspection, and employment. For almost one year I was the Nuclear Damage Assessment Officer for 27th Air Division and for nearly three (3) years I was the NATO Nuclear Release Officer to either 1st Belgian Corps or 1st British Corps.

It is with these qualifications as well as my recent studies of the Defense Nuclear Agencies report on Operation Crossroads and the Warren Papers that I come to testify before this Senate committee.

DISCUSSION:

My presentation today will center around the Radiological Safety Section and the Dose Reconstruction actions presently being performed for Atomic Veterans by the Defense Nuclear Agency.

During my own reconstruction efforts and my study of DNA Report #6032F and the Warren Papers, I have discovered a number of discrepancies in basic the data which led me to believe that the DNA Caculated (Reconstructed) Dose exercise has very little useful value in assisting Atomic Veterans to establish a claim based on injuries resulting from exposure to radiation at Crossroads.

First of all the Radiological Safety Section was an organization which performed exactly what it's middle name indicated "SAFETY". We were trained, equipped, employed and functioned as a personnel safety unit. Our training and equipment was not designed for precision data gathering. The data which has survived these thirty-nine (39) years was gathered and reported solely as a tool to protect the men assigned to JTF-1 from injury by the effects of residual nuclear radiation. Any other benifits from this radiation data or information is purely accidental. All of the equipment was pieced together on the spur of the moment from available sources.

Personnel film badges were manufactured using an untested configuration based on theory. Field survey instruments were the first of their kind and also had not been tested under field conditions. There was not a reliable instrument to detect Alpha contamination under field conditions - period! Radiological decontamination of a Naval vessel had never been attempted before. Personnel protection on such a vast and complicated scale had never been attempted prior to Crossroads. The fact that we managed to muddle through the exercise and not have immediate fatalities is a wonderous testament to Dr. Stafford L. Warren's marvelous talents and energy. GOD's grace had to have been a great influnce on this outcome.

In seven generations of my family, I am the first and only member to have had cancer. It was diagnosed 13 years following Crossroads. I shall surely become dust before the medical profession gathers enough data to decide if my exposure to radiation was the cause of my genital cancer. Then they can start gathering data to determine if the 37,000 Roentgens of X-Ray exposure given me by Army doctors as post operative therapy was the cause of my heart attacks which started ten (10) years later when I was fourty-one years of age.

In 1978, I wrote to the Atomic Energy Commission asking for my radiation exposure and film badge data while serving as a member of JTF-1 during Operation Crossroads. I received two replies. The first stated that I had received 0.270 REM gamma and 0.500 RAD beta. The second reply indicated that film badges on 8, 12 & 15 August 1946 indicated zero exposure and that film badge data from the period of3 September 1946 through 1 October 1946 indicated that I had recieved exposures of 0.270 R gamma and 0.500 R beta.

Upon joining the National Association of Atomic Veterans and becoming the Reconstruction Coordinator for Operation Crossroads in 1984, I sent a FOIA request to the DNA requesting my total exposure dose during Crossroads as well as certain documents and information about Crossroads. The reply received was exactly the same dose as the previous AEC reply except that the dates were different and they had added caculated data because I had served on the USS Haqven and the USS Suncock. My total Reconstruction (Caculated) Dose was now a total of 1.430 R gamma and 0.530 beta.

Next, I sent in a second FOIA request for specific exposure information on dates taken from various government documents. Shortly there after, I received a reply from DNA indicating that they were doing a detail study on my dose and that I would receive a reply within 30 days. When the reply was received and the additional DNA dose data was combined with the previous information, my Total (Reconstructed) Dose was now 2.788 R gamma and 0.530 R beta for my exposure at Crossroads. This new Total Dose for gamma exposure now indicated a value which was over 1000% higher than the originally reported Total Dose level.

There are several remaining doubts in my mind about the accuracy of this latest Total Reconstructed (Caculated) Dose. For instance, as a RAD-SAF Moniter, I was never allowed off of the Haven to work without a film badge. However, out of the seventy (70) day period following baker test, the DNA can locate only thirteen (13) film badge readings for me in their records. Further; I am told by DNA that they can not furnish me with requested RAD-SAF Moniter "Report Sheets" (various dates) because they do not have them. Yet in two instances the DNA caculated the dose I received on two seperate dates which could only have been based on the "Report Sheet" data. "Radiological Safety (RAD-SAF) Moniter Reports" are listed in paragraph 2 on page 540 of DNA 6032F as one of the base documents used in dose reconstruction. Additionally, on 12 different days they assigned dose levels to me based on the average film badge readings of RAD-SAF Monitors after Baker Test but they failed to assign any exposure dose for a one week period (27 August - 2 September 1946) and an additional two week period in September (12 -24 September 1946).

Repeatedly DNA resorts to averaging exposures rather than using specific data points. Also, most RAD-SAF monitors following Test BAKER, whom I knew, operated around the upper limit of the 0.1 R/24 hour tolerance, using dosemeter observations, and on several occasions exceeded that limit. Reports of overdose exposures on film badge reports contained in the Warren Papers certainly also confirm this as fact.

Of the seventy-six (76) film badges listing exposures for personnel from the USS Salt Lake City, for the period of 2 thru 8 August 1946, thirty-seven film (37) badges indicated overdose exposures had occurred. Overdose readings ranged from 10% to 400%. Ten (10) additional badges indicated readings of 0.1 R the allowable tolerance. Six of the personnel receiving overdose exposures were RAD-SAF monitors. The senior monitor, Lt.Cmdr. Royce K Skow, USN, received an overdose on five (5) of the seven (7) days of this period.

Another indication of the overdose condition is contained in Colonel Stafford L. Warren's message report prior to departing Crossroads. The message was addressed to CJTF-1 and was dated 15 AUG 1946. In part, the message stated " X DSM SURVEY AND PREPARATIONS FOR TOWING WELL MONITORED, 125 BADGES ISSUED FOR 150 MEN - 26 OVER EXPOSURES WITH 13 OVER TWICE TOLERANCE X "

The significant point of my DNA dose reconstruction is, if I had submitted a claim to the Veterans Administration prior to last year, the Veterans Administration would have considered my total exposed dose at the much lower original level of 0.270 REM gamma and 0.500 RAD beta rather than the present dose which is presently ten (10) times the original and routine value reported by DNA.

I was aboard more than fifty (50) target vessels and rarely were my dosemeter readings much below the tolerance level (DNA even reports that I exceded the tolerance four (4) times). Throw in the radioactive salt water showers, radioactive toilets, the hundreds of trips back and forth over the radioactive lagoon in radioactive landing craft, a few more over tolerance days, etc, then my true external dose could be some where well above 10 REM gamma and at least 50 RAD beta. The amount of alpha and beta radiation I breathed and ingested is known only to GOD. All this time I had naval personnel all around me soaking up the same good old radiation.

The sad part of this Reconstruction Dose exercise is that; I was a trained RAD-SAF monitor equipped with protective clothing, a rebreather apparatus, real time radiation survey-detection devices and film badges; while the vast majority of the Naval personnel around me were wearing regular Navy fatigue clothing while up to their necks in radioactive dirt, dust, water and who knows what. Knowing all of this, the DNA still persists that "There were no injuries to personnel from exposure to radiation".

These men worked on the target ships sloshing around in radioactive water used to wash down the ships; chipping radioactive paint; stripping radioactive canvas, lines, and equipment, etc, from ships and throwing them over board; and/or were being soaked by radioactive water dripping from canvas fire hoses while washing down decks. Then they sat for half an hour or longer in a small radioactive landing craft back to a decontamination ship or barge before they could take a shower. The showers were salt water which passed thru pipes that later were declared dangerously radioactive and had to have extensive decontamination. All this before they could get freshly laundered clothing which was also radioactive but had been blessed as being below a magical tolerance level established by the Medical/Legal Board personnel who shortly there after folded their tents and departed for the USA.

Now after 39 years using a so called logical methodology, the science of mathematics, computer models, antiquated Film badge technology, and dubious data measured by expermental instruments; similarly blessed people can establish with absolute accuracy that an Atomic Veteran's Total (Reconstructed) Dose for Crossroads in most cases IS "this" or "that" REM gamma. The DNA turns right around and fails to draw on this magical computer bank to caculate and report the beta dosage pertaining to these veterans. Then to add insult to injury the ingestion or inhalation dose of Beta and Alpha is not even addressed by the DNA. This is the type of critical technical information which is sent to the VA on which a claim decision is made.

I have talked to or corresponded with hundreds veterans from Crossroads and by using the DNA exposure tables, I find that the doses given to these veterans by the DNA is based only on to which ship(s) they were assigned and no consideration is given concerning the job assignments performed by these veterans or the working conditions under which they labored. Because of all of these shortcommings, I have serious doubts about the validity and the intent of the DNA Reconstructed (Caculated) Dose configuration. I also doubt that the personnel employed by the DoD contractor who prepared DNA Report #6032F have even the foggiest idea concerning the radiological problems and working conditions which occurred at Crossroads.

The policy within the Defense Department concerning whether or not a serviceman was exposed to harmfull levels of radiation was established fourty (40) years ago by a statement made by Colonel Stafford L. Warren in 1946. Quote - "On President Harry S. Truman's instructions to Admiral Blandy, I was to safeguard what was eventually a 42,000 man operation from the "peculiar hazards" of the atomic bomb and was to devise a radiologic defense organization and pattern for both military and civilian operations. At the end of the JTF-1 operation, it could be said that no one had been injured by the "peculiar hazards" inherent in it." - Unquote.

To this end Colonel Warren formed what he titled the Medical/Legal Board. One purpose of the board was to give what assurance was possible that no successful suits could be brought on account of the radiological hazards of Operation Crossroads. This board issued the following statement after its first meeting on 30 June 1946, the eve of the first test: "There are some 40,000 persons engaged in these operations. Among these there are sure to appear, soon or late, a number of cases of organic or functional disease, some of which will be of a type known or reputed to have followed exposure to radiations. It is predictable that some of these cases will be attributed to the radiations from the Atomic Bomb. Such diseases appear spontaneously in the human race with out previous exposure to man made radiations. We expect that no such attribution will be well founded, and we expect that the records under the regulations of the Radiological Safety Section will in all such cases be adequate to show that the quantity of radiation received by that particular person was below the threshold of perceptible biologic injury."

The final report, prepared by Dr. R.R. Newell M.D., Board Chairman, of the board stated in paragraph F. - " The Operation Crossroads, Tests Able and Baker, were carried through without irradiation injury to any persons. * * * The board is scattered, and at the time of writing this summary cannot be reconvened. The conclusion will therefore have to stand as the opinion of the Chairman.".

The following statement is from the DNA Fact Sheet dated March 3, 1982. It also appears in every Ship's History Sheet which I have read which was written by the DNA for Ships which were at Crossroads. " Overall, the recorded radiation exposures for Operation CROSSROADS were relatively low.". (Underline emphasis added).

PERSONAL OBSERVATIONS:

1. Radiological measurements made at Crossroads were at the very best approximate indications of the radiation fields present. They were used as a guide to monitor troop safety. They were not of suffient quanity or quality to be used for the determination of total dose levels.

2. Film badge data was not of sufficient quanity and quality to be of value in determining the dose of anyone but the wearer and then they should be considered suspect when little or no exposure was recorded.

3. Lack of protective clothing and sufficient rebreather equipment for a vast number of the troops involved contributed greatly to the inhalation and ingestion of alpha and beta particles by the majority of troops engaged in decontamination folllowing Test Baker at Crossroads.

4. The mass boarding of target vessels by ship's boarding parties coupled with inadequate personnel decontamination facilities at Bikini Atoll greatly assisted in the contamination of support ships where these target ship crews were housed.

5. The use of lagoon salt water to wash down target ships, to produce fresh water, for sanitation, for bathing of personnel, and for general support ship cleaning, etc., greatly increased the exposure of troops to most types of low level radiation.

6. To attempt to caculate a accurate " Total Dose " for any individual who was present at Crossroads is unrealistic at best.

CONCLUSIONS:

1. The severe radiological contamination at Crossroads was caused by the underwater detonation of the emplosion type Plutonium weapon. This radiation was in the form of radiation which had been induced in coral particles and the sodium in the salt water and risidual radiation in the form of fission particles from the weapon detonation and unfissioned plutonium used in the weapon.

2. Radiation levels aboard target ships and the resulting " Stay Times " were quick and

dirty estimates based on a few quick measurements. These " Stay times " were revised periodicily but remaind as best estimates totally subjective in nature depending on the skill of the particular RAD-SAF monitors skill and his experience. The pocket dosemeter was the monitors main tool for assessing "Stay Time" accuracy.

3. Film badges were used primarily to check the effectiveness and efficiency of monitors by the RAD-SAF command and staff personnel. Their short commings were reconogized at the time and they were never meant to be used as a permenent and all encompassing record on which the " Total Dose " of any and all individuals present at the tests could be caculated.

4. The DNA is providing lip service to atomic veterans with the extreemly low total dose caculations. While the navy contends the higest "Total Dose" received the Crossroads was an enlisted monitor who received 3.72 REM gamma, they informed me that my "Total Dose" was 0.270 REM gamma. However, my "Total Dose" presently is 2.778 REM gamma. This other monitors "Total Dose", and many of the navy men who were around him, could therefore be as much as 37.20 REM gamma.

5. There were many overdose occurrances among the RAD-SAF monitoring personnel. Therefore, it is logical to assume there were many overdose occurrances amoung the navy personnel whom they accompanied.

CLOSING REMARK:

It is interesting to note that the Navy took thirty-eight (38) years to publish a detail report on "Operation Crossroads" and another year for GAO to audit the report and find that it still is sadly lacking in it's accuracy. Likewise, it is interesting to speculate the effect this review could have had on subsequent radiological safety measures for the following 262 nuclear tests which were conducted for the next sixteen (16) years. The Atomic Veterans of the United States Armed Services have waded through Multi-Megatons of nuclear radiation and those in government who were responsible for their supervision and are responsible for their welfare steadfastly declare that none have received damage to their health from radiation. Keep the faith a cure is on the way, shortly! The cure is Father Time !!

BOLEY H. CALDWELL III
National Association of Atomic Veterans
Operation Crossroads - Reconstruction Coordinator

BACKGROUND INFORMATION

BOLEY H. CALDWELL III
Lieutenant Colonel (Retired) U.S. Army

Enlisted Service (Reserve): (29 May - 14 December 1945)	**Army Specilized Training Reserve Program** **Texas A&M University (Engineering)**
Enlisted Service (Active) : (15 Dec. 1945 - 24 Nov 1946)	**Architectural Draftsman, Los Alamos, New Mexico.** **Radiological Safety Monitor, RAD-SAF Section, JTF-1.** (30 May - 3 Oct. 1946).
College Studies: (Jan 1947 - May 1948)	**Southern Methodist University (Physics Major)**
Enlisted Service (Active): (1 Nov. 1948 - 30 June 1949)	**Officers Canidate School Class #10, Ft. Riley, Kansas.** Commissioned 2d Lt. Coast Artillery Corps.
Commissioned Service (Active):	**Battery Officer** **Fire Control and Missile Systems Officer** (Battalion, Group & USAD Region levels) **Nuclear Weapons Employment Officer** (Battalion, Group & USAAD Region levels) **Electronics Instructor - Royal Saudi Arabian AD School** (Royal Saudi Arabian Artillery School) **Nuclear Damage Evaluation Officer** (Air Force - Air Division level) **Nuclear Weapons Assembly & Inspection** (Group, Brigade and USATC levels) **Nuclear Weapons Release Officer (NATO)** (British & Belgian Army Corps level) **Logistics Officer** (Brigade and USATC levels)

OPERATION CROSSROADS
RELEASE OF RADIATION EXPOSURE
FOR
T-4 Boley H. Caldwell III
RA 18 243 639

April 18, 1978 (DOE)

1946 + Gamma = 270 MREM
Beta = 500 MRAD

June 19, 1978 (DOE)

8 Aug. 1946 = 0 Exposure
12 Aug. 1946 = 0 Exposure
15 Aug. 1946 = 0 Exposure
3 Sep. IO
1 Oct. 1946 = Gamma = 270 mR & Beta = 500 mR

September 27, 1984 (NTPR)

1 July '46= Gamma = 0 mR, Beta = 0 mR
2 Jul. '46 = Gamma = 10 mR, Beta = 0 mR *
25 Jul. '46 = Gamma = 70 mR, Beta = 0 mR
26 Jul. '46 = Gamma = 200 mR, Beta = 0 mR
4 Aug. '46 = Gamma = 110 mR, Beta = 0 mR #
5 Aug. '46 = Gamma = 60 mR, Beta = 0 mR *
6 Aug. '46 = Gamma = 60 mR, Beta = 0 mR *
7 Aug. '46 = Gamma = 105 mR, Beta = 0 mR *#
8 Aug. '46 = Gamma = 0 mR, Beta = 0 mR *
9 Aug. '46 = Gamma = 60 mR, Beta = 0 mR *
10 Aug. '46 = Gamma = 60 mR, Beta = 0 mR *
12 Aug. '46 = Gamma = 0 mR, Beta = 0 mR
13 Aug. '46 = Gamma = 60 mR, Beta = 0 mR *
14 Aug. '46 = Gamma = 0 mR, Beta = 0 mR
15 Aug. '46 = Gamma = 83 mR, Beta = 0 mR * ●
16 Aug. '46 = Gamma = 60 mR, Beta = 0 mR *
17 Aug. '46 = Gamma = 60 mR, Beta = 0 mR *
18 Aug. '46 = Gamma = 60 mR, Beta = 0 mR *
19 Aug. '46 = Gamma = 60 mR, Beta = 0 mR *
20 Aug. '46 = Gamma = 60 mR, Beta = 0 mR *
21 Aug. '46 = Gamma = 60 mR, Beta = 0 mR *
22 Aug. '46 = Gamma = 60 mR, Beta = 0 mR *
23 Aug. '46 = Gamma = 60 mR, Beta = 0 mR *
3 Sep. '46 = Gamma = 60 mR, Beta = 0 mR *]
6 Sep. '46 = Gamma = 0 mR, Beta = 0 mR]
10 Sep. '46 = Gamma = 0 mR, Beta = 0 mR]
11 Sep. '46 = Gamma = 10 mR, Beta = 0 mR]
25 Sep. '46 = Gamma = 30 mR, Beta = 0 mR]
26 Sep. '46 = Gamma = 10 mR, Beta = 0 mR]
1 Oct. '46 = Gamma = 160 mR, Beta = 0 mR]
USS Haven = Gamma = 430 mR, Beta = 0 mR *
USS Suncock= Gamma = 730 mR, Beta = 0 mr *

TOTAL=Gamma =2.768 R. & Beta=.53R

July 31, 1984 (NTPR)

1 Jul. '46 = Gamma = 0 mR, Beta = 0 mR

25.Jul. '46 = Gamma = 70 mR, Beta =30 mR
26 Jul. '46 = Gamma = 200 mR, Beta = 0 mR

8 Aug. '46 = Gamma = 0 mR, Beta = 0 mR

12 Aug. '46 = Gamma = 0 mR. Beta = 0 mR

14 Aug. '46 = Gamma = 0 mR, Beta = 0 mR
15 Aug. '46 = Gamma = 0 mR, Beta = 0 mR

3 Sep. IO
1 Oct. '46 = Gamma = 270 mR, Beta =500 mR

TOTAL = Gamma = .270 R & Beta =.53 R

Estimated and calculated dosage at present (1985) is >10 times higher than the dosage initially reported in April & June of 1978 & July 1984.

NOTES: * Indicates dosage assigned by NTPR based on general RAD-SAF monitor activities.
# Indicates overdose received by Lt. R.D. Tebbet, MC, USA, Senior Monitor IBT #10 as reported in the Warren Papers.
● Indicates Film Badge was not readable. Dose caculated using Stay Time & Intensity.

ENCLOSURE-3

☐ OPERATIONS CROSSROADS ☐

"CALENDAR OF EVENTS"

1946

* Dose Reconstruction For *

Tec-4. Caldwell, Boley N. III, RA 18 243 639, (CE) USA.

INITIAL BOARDING TEAM #10

FEB 1946

17 (Sun) Assigned to Los Alamos, New Mexico.

MAY 1946

14 (Tue) Assigned to JTF-1: per SO #99, 9812th Technical Service Unit- Corps of Engineers, Manhattan District, Santa Fe, New Mexico
23 (Thr) Departed Los Alamos, New Mexico, for Oakland Army base via train.
27 (Mon) Arrived at Oakland Army Base, CA., from Los Alamos, N. M.
29 (Wed) Departed CONUS aboard the U.S.S. HAVEN (AH-12).
30 (Fri) Began training as Radiological Safety Monitor (RAD-SAF).

JUN 1946

3 (Mon) Issued JTF-1 Staff I.D. Card #3888.
4 (Tue) Arrived Hawaii 0708 Hrs. + One Day Shore Pass +
5 (Wed) Departed Hawaii 1320 Hrs. for Bikini - Continued training as RAD-SAF Monitor.
12 (Wed) Arrived at Bikini Atoll, Marshall Islands, at 1119 Hrs.
15 to 29 Training of RAD-SAF personnel continued. **Queen Day** on 19 June. (Eight weeks total training)
30 (Sun) Air Survey, Lagoon Survey and Boarding Teams assembled aboard the U.S.S. Wharton (AP-7) with RAD - SAF personnel to evacuate Bikini Lagoon in preparation for Test Able. **IBT #10** assigned to the U.S.S. SUNCOCK (AN-80).

JUL 1946

Able Test Day

1 (Mon) Atomic Device, 23 KT (*Little Boy*) type, detonated as an air burst for Test Able at 0900 hrs. local time. [The Little Boy was a **gun type** Uranium device detonated at an altitude of 520 feet]. **IBT #10** aboard the U.S.S. Suncock (AN-80) when it entered Bikini at 1329 hrs. and anchored at Berth Fox at 1336 hrs. The following is a chronological list of events for **IBT #10** on this date:

1543 Hrs. - Departed Berth Fox
1612 Hrs. - Arrived ATA - 192
1615 Hrs. - Boarded ATA - 192 (Checked fire fighting equipment)
1632 Hrs. - Departed ATA - 192 (Stay-Time = 17 Min.)
1653 Hrs. - Boarded APA - 85 (USS Gasconade)
1725 Hrs. - Departed APA - 85 (Stay -Time= 21 Min.)
1740 Hrs. - Arrived PB2Y-5's #7052 & #7085 (Took Photo's.)
1742 Hrs. - Departed PB2Y-5 (Seaplane anchorages)
1800 Hrs. - Arrived APA - 68 (USS Butte , On Fire - Not Boarded)
1810 Hrs. - Departed APA - 68 (Stay-Time= 0 Min.)
1815 Hrs. - Arrived APA - 75 (On Fire - Boarded)(USS Cortland)
1830 Hrs. - Departed APA - 75 (Stay-Time= 15 Min.)
1914 Hrs. - Arrived and anchored at Berth Peter.

Film Badge exposure data: **Gamma = 0.00 R & Beta = 0.00 R.**

* * * THIS 7 PAGE DOCUMENT PREPARED IN FINAL FORM ON 18 April 1985 * * *
(Revised on 27 November 1985)

Enclosure - 4.

JULY 1946

Able Day + 1

2 (Thur) The following is a chronological list of events for IBT #10 operating from on board the U.S.S. Suncock (AN-80) this date:

0705 Hrs. - Departed Berth Peter
0805 Hrs. - Arrived U.S.S. Butte (APA-68) (Boarded Tgt. Vessel)
0852 Hrs. - Departed (APA-68) {Stay-Time = 47 min.}
0905 Hrs. - Arrived U.S.S. Barrow (APA-61) (Boarded Tgt. Vessel)
0945 Hrs. - Departed (APA--61) {Stay -Time = 40 Min.}
1015 Hrs. - Arrived U.S.S. Cortland (APA-75) (Boarded Tgt. Vessel)
1037 Hrs. - Departed (APA-75) {Stay-Time = 22 Min.}
1045 Hrs. - Arrived PB2Y5 (Boarded Seaplane)
1050 Hrs. - Departed PB2Y5 {Stay-Time = 5 Min.}
1120 Hrs. - Arrived U.S.S. Wainwright (DD-419) (Boarded Tgt. Vessel)
1135 Hrs. - Departed (DD-419) {Stay-Time = 15 Min.}
1145 Hrs. - Arrived U.S.S. Wilson (DD-408) (Boarded Tgt. Vessel)
1201 Hrs. - Departed (DD-408) {Stay-Time = 16 Min.}
1250 Hrs. - Arrived LCT-1013 (Boarded Tgt. Vessel)
1253 Hrs. - Departed LCT-1013 {Stay-Time = 3 Min.
1410 Hrs. - Arrived at U.S.S. Wharton (AP-7). Commissioned members of IBT #10 recovered to the (AP-7). Enlisted members of IBT #10 remained aboard (AN-80) overnight.

NTPR Caculated Dose: **Gamma = .01R & Beta = ?.?**

Able Day + 2

3 (Wed) All initial radiological survey work for Fallout, Lagoon and Target Ships completed . No extensive deposits of long life radioactive fission products or alpha emitters were found on the target vessels. All RAD-SAF Monitors recovered to the U.S.S. Haven (AH-12) at 1400 Hrs. RAD-SAF monitoring coverage started for clean-up working parties after Test Able.

18 (Thu) IBT #10 with Monitors boarded the U.S.S. Suncock (AN-80) at 1214 Hrs. The (AN-80) was anchored off the starboard side of the U.S.S. Henrico (PA-45). Underway in accordance with C.T.U. 1.2.7 Op. Plan. (AN-80) proceded to open ocean passing channel bouy #1 at 1410 Hrs.

Mike Day

19 (Fri) U.S.S. Suncock (AN-80) reentered Bikini Lagoon at 1224 Hrs. to complete simulated boardings of assigned target ships for Baker Test. Arrived at U.S.S. Catron (APA-71) at 1320 Hrs. Made simulated boarding run. Arrived at Japanese Battleship Nagato at 1400 Hrs. Made simulated boarding run. Proceeded to Berth #108 and anchored at 1753 Hrs. RAD-SAF Monitors recovered to the U.S.S. Haven (AH-12) at 1825 Hrs.

24 (Wed) IBT #10 with Monitors boarded U.S.S. Suncock (AN-80) at 1245 Hrs. in the vicinity of Berth #88. (AN-80) underway at 1315 Hrs. in accordnance with CTU 1.2.7 OP. Plan Test Baker. Passed channel bouy #1 to starbord at 1407 Hrs. Proceeded to open sea in preperation for Test Baker on following day.

Baker Test Day

25 (Thr) Atomic Device, 23 KT (Fat Man) type, detonated as shallow underwater burst for Test Baker at 0835 Hrs. local time. [The Fat Man was an emplosion type Plutonium device surpended by cables from the LSM-60 at a depth of 90 feet.] IBT #10 aboard the U.S.S. Suncock (AN-80) when AN-80 reentered the lagoon at 1143 Hrs. and anchored at Berth Roger. The following is a chronological list of events for IBT #10 on this date:

1151 Hrs. - Departed Berth Roger
1241 Hrs. - Arrived U.S.S. Cortland (APA-75) (Boarded Tgt. Vessel)
1306 Hrs. - Departed APA-75 {Stay-Time = 25 Min.}
1310 Hrs. - (AN-80) ordered to stop. (Approximate time of crossing outer limit of Base Surge line). The lagoon water inside the Base Surge Line was highly radioactive. Four vessels on the southern string and one vessel on the southwest string could be approached and reboarded.
1402 Hrs. - (AN-80) ordered to proceed

1412 Hrs. - Arrived U.S.S. Carteret (APA-70) {*GEIGER SOUR*}
1423 Hrs. - North of (APA-70) awaiting orders.
1450 Hrs. - Along starboard side (APA-70) {*GEIGER SOUR*]
1453 Hrs. - North of (APA-70) awaiting orders
1554 Hrs. - Along port side (APA-70) {*GEIGER SOUR*}
1559 Hrs. - North of (APA-70) awaiting orders.
1612 Hrs. - Underway to Berth Roger.
1702 Hrs. - Anchored at Berth Roger off Enyu Island.
Film Badge exposure data: **Gamma = 0.07 R & Beta = 0.03 R.**

Baker Test +1

26 (Fri) AN-80 Anchored Berth Roger awaiting orders - Lagoon (*GEIGER SOUR*).
Film Badge exposure data: **Gamma = 0.20R & Beta = 0.00 R.**
(Note: Five APA's, Cortland, Geneva, Bladen, Fillmore and)
(Niagara, not exposed to radioactive fall-out were reboarded)
(by crews and were decontaminated by scrubbing with soap,)
(water and rinsing down with salt water.)

27 (Sat) AN-80 Anchored Berth Roger awaiting orders - Lagoon (*GEIGER SOUR*).
(Note: USS Hughes DD-410 washed down with high pressure (salt water after
(beaching in Geiger Sweet water. DD-410 sprayed with Fomite then washed
(down with salt water. A second application of Fomite was applied to DD-410
(and left on over night. Reduction of radiation minimul.)
DSM AND RAD-SAF representatives met to develop a satisfactory method
for the rapid removal of radioactive material from target vessels.

28 (Sun) AN-80 Moved to special berthing 1175 yards south of Berth #379 at 1629 Hrs.
(Note: USS Hughes DD-410 was washed off with salt water to) (remove Fomite.)

29 (Mon) AN-80 Anchored 1175 yards south of Berth #379 - Lagoon (*GEIGER SOUR*).
(The USS Tuna SS-203 was washed down with a solution of lye
(and boiler compound and then rinsed with sea water.
(Radiation levels were reduced by 66%. This method of initial
(decontamination was adopted by DSM for all target ships to
(get ships crews back on target ships for more detail
(scrubbing and paint removal.)

Baker Test + 5

30 (Tue) AN-80 Moved to Berth Roger off Enyu Island at 1525 Hrs.
31 (Wed) AN-80 Same as Above except to take on water at USS Wildcat (W-2)

AUG 1946

Baker Test + 7

1 (Thr) AN-80 Anchored at Berth Roger - Lagoon (*GEIGER SOUR*)
2 (Fri) AN-80 Moved to special berthing 1175 yards south of Berth #379 at 1704 Hrs.

Baker Test + 9

3 (Sat) The following are the chronological events for IBT #10 this date:
0759 Hrs. - Departed Berth # 379
0825 Hrs. - Arrived at USS Fulton and picked up scientists Mr. Holder and Mr. Vine with instrumentation team.
0832 Hrs. - Departed USS Fulton
0910 Hrs. - Commenced recovery south of USS Nevada(BB-36) of Lagoon Bottom Pressure Gages, cable and bouys.
1505 Hrs. - Completed recovery of gages, cable and bouys tied up to bouy astern of USS New York (BB-34).
1628 Hrs. - Transfered gages, instruments & scientists to motor launch.
1629 Hrs. - Departed vicinity of (BB-34).
1700 Hrs. - Anchored at berthing 1175 yards south of Berth #379.

Baker Test + 10

4 (Sun) AN-80 Anchored at special berthing 1175 yards south of Berth # 379.
(Note: Lt. R. D. Tebbett's Film Badge Dose **Gamma = .11 R & Beta =?.?**)

AUG 1946

Baker Test + 11

5 (Mon) AN-80 Anchored 1175 yards south of Berth #379. Commissioned members of IBT #10 transfered by motor launch to the USS Wharton.
NTRB Caculated Dose: **Gamma = .06 R & Beta = ?.?**

6 (Tue) AN-80 Anchored as Above.
NTRB Caculated Dose: **Gamma = .06 R & Beta = ?.?**

Baker Test + 13 days

7 (Wed) The following are the chronological events for IBT #10 for this date.

0830 Hrs. - Departed Berth #379
0844 Hrs. - Arrived USS Wharton and picked up Commissioned members of IBT #10.
0849 Hrs. - Departed USS Wharton
0925 Hrs. - Moored to USS Gasconade (APA-85) (Boarded Tgt. Vessel)
1112 Hrs. - Departed (APA-85) {Stay-Time = 1 Hr.-47 Min.} Circled (APA-85) and took pictures
1130 Hrs. - Arrived at USS Wharton. Commissioned members of IBT #10 transfered to USS Wharton
1135 Hrs. - Departed USS Wharton
1245 Hrs. - Anchored at Berth Roger.

NTRB Caculated Dose: **Gamma = .105 R & Beta = ?.?**

Baker Test + 14

8 (Thr) The following are the chronological events for IBT #10 aboard the AN-80 for this date:

0755 Hrs. - Departed Berth Roger
0812 Hrs. - Arrived at USS Wharton to pick up commissioned members of IBT #10.
0825 Hrs. - Departed USS Wharton
0850 Hrs. - Arrived LST-545 (Boarded Tgt. Vessel
0900 Hrs. - Departed LST-545 {Stay-Time = 10 Min.)
0917 Hrs. - Arrived LST-661 (Boarded Tgt. Vessel)
0925 Hrs. - Departed LST-661 {Stay-Time = 8 Min.)
0945 Hrs. - Arrived LST-52 (Boarded Tgt. Vessel)
0953 Hrs. - Departed LST-52 {Stay-Time = 8 Min.)
1004 Hrs. - Arrived LST-133 (Boarded Tgt. Vessel
1012 Hrs. - Departed LST-133 {Stay-Time = 8 Min.}
1032 Hrs. - Arrived USS Crittenden (APA-77) (Boarded Tgt. Vessel)
1055 Hrs. - Departed (APA-77) {Stay-Time = 23 Min.)
1115 Hrs. - Arrived at USS Wharton. Commissioned Members of IBT #10 boarded motor launch for the USS Wharton.
1123 Hrs. - Departed USS Wharton
1140 Hrs. - Arrived and anchored at Berth #88.

Film Badge exposure data: **Gamma = 0.0 R & Beta = 0.0 R.**

Baker Test + 15

9 (Fri) Aboard USS Suncock (AN-80): (Note: DSM, RAD-SAF and CMDR. TARGET GROUP inspected vessels undergoing detailed deconamination. An analysis of material samples collected revealed the widespread presence of **alpha & beta emitters** throughout the target area.
NTRB Caculated Dose: **Gamma = .06 R & Beta = ?.?**

Baker Test + 16

10 (Sat) Aboard USS Suncock (AN-80): (Note: As a result of the previous day findings * * * **DSM ordered all further decontamination on target vessels discontinued.** * * *
NTRB Caculated Dose: **Gamma = .06 R & Beta = ?.?**

Baker Test + 17

11 (Sun) RAD-SAF enlisted monitors recovered to USS Haven AH-12 at 1200 Hrs.

Baker Test + 18

12 (Mon) Exposure while with working party on the USS Butte (APA-68).
Film Badge data indicates: **Gamma = 0.00 R & Beta = 0.00 R.**

AUG 1946

Baker Test + 19

13 (Tue) Aboard USS Fallon & USS Ralph Talbot with working parties.
NTRB Caculated Dose: **Gamma = .06 R & Beta = ?.?**
RAD-SAF Memorandum assigned monitors and support personnel to remain at Kwajalein Atoll for the "Stablization Period". Target Ships and JTF-1 personnel to be moved to Kwajalein Atoll due the the extreem contamination of the target vesssels and the lagoon water with alpha particles.

Baker Test + 20

14 (Wed) Film Badge exposure while monitoring diving operations aboard the USS Preserver (ARS-8): (The following from Deck Log of ARS-8).
0820 Hrs. - Lt.(jg) Mason M. Sperry, USN, and Sgt. Boley H. Caldwell III went aboard the USS Preserver (ARS-8) as Radiological Safety Monitors for the dragging operation for the recovery of gamma meters in accordnance with CTU-1.2.7.
1557 Hrs. - Lt.(jg) Sperry departed the ARS-8.
1910 Hrs. - Sgt. B.H. Caldwell departed the ARS-8.(Stay-Time = 10 Hrs.- 50 Min.
Film Badge exposure data: **Gamma = 0.00 R & Beta = 0.00 R.**

Baker Test + 21

15 (Thr) Assigned as working party RAD-SAF Monitor for APA-77.
0940 Hrs. Arrived at the (AN-80) near USS Crittenden (APA-77).
0854 Hrs. Boarded APA-77 and cleared Tgt. vessel for boarding for Captain and working party.
1658 Hrs. Reboarded AN-80 with working party.(Estimated Stay-Time = 1 Hr.) (& 30 Min.)
Film Badge(*NTPR Caculation*) data: **Gamma = .083 R & Beta = ?.?**

Baker Test + 22

16 (Fri) Aboard the USS New York. (Note : Change of Command for the RAD-SAF Section of JTF-1. 1230 Hrs. *Colonel Stafford L. Warren, (MC) USA* departed the USS Haven(APH-112) for CONUS. Cmdr. Eugene P. Harris, USN, assumed command of the RAD-SAF Section of JTF-1.)
NTPR Caculated Dose. **Gamma = .06 R & Beta = ?.?**

Baker Test + 23

17 (Sat) Aboard USS Carteret with working party.
NTPR Caculated Dose: **Gamma = .06 R & Beta = ?.?**

Baker Test + 24

18 (Sun) Tec.-4. Boley H. Caldwell III, (CE) USA, Assigned to "Tugs and Diving Monitoring Group" of the RAD-SAF Section.
Aboard the USS Carteret with working party.
NTPR Caculated Dose: **Gamma = .06R & Beta = ?.?**

Baker Test + 25

19 (Mon) *JTF-1 Ordered to shift base of operations to Kwakalein Atoll.*

Aboard the USS Pennsyvlvania with working party.
NTPR Caculated Dose: **Gamma = .06R & Beta = ?.?**

Baker Test + 27

21(Tue) Aboard theUSS Hughes with working party.
NTPR Caculated Dose: **Gamma = .06R & Beta = ?.?**

Baker Test + 28

22(Wed) Aboard the USS Pensacola with working party.
NTPR Caculated Dose: **Gamma = .06R & Beta = ?.?**

Baker Test + 29

23(Thr) Aboard the USS Fallon with working party.
NTPR Caculated Dose: **Gamma = .06R & Beta = ?.?**

AUG 1946

25 (Sun) Aboard the USS Haven (APH-112).
1603 Hrs. USS Haven underway from Berth 111 in Bikini Atoll for departure to Kwajalein Atoll IAW CTC 1.2 dispatch 2202322 Aug. 1946.
1648 Hrs. USS Haven (APH-112)Cleared Bikini Lagoon.
26 (Mon) Aboard the USS Haven (APH-112).
0746 Hrs. Entered Kwajalein Atoll through GEA pass.
0900 Hrs. Anchored in Anchorage King, Berth 16, Kwajalein Atoll.
1316 Hrs. Underway to shift anchorages.
1351 Hrs. Anchored at Anchorage Able, Berth 44.

Stablization Period of Operation Crossroads
(Kwajalein Atoll, Marshall Islands)

SEP 1946

Baker Test + 40

3 (Tue) Aboard DD's and LCI-327 with working parties.
Film Badge exposure data: **Gamma = .06 R & Beta = .15 R**

4 (Wed) *Ammunition Removal from Target Ships Commenced.*

Baker Test + 43

6 (Fri) Aboard USS Munford with working parties.
Film Badge exposure data: **Gamma = .00 R & Beta = . 0 R**

Baker Test + 47

10 (Tue) Aboard USS Skipjack with working parties.
Film Badge exposure data: **Gamma = .00 R & Beta = . 0 R**

Baker Test + 48

11 (Wed) Aboard USS Carteret with working parties.
Film Badge exposure data: **Gamma = .01 R & Beta = .01 R**

* * *(~~14~~ 13 Days of Exposure not accounted for) * **

Baker Test + 62

25 (Wed) Aboard USS Gasconade with working parties.
Film Badge exposure data: **Gamma = .03 R & Beta = .03 R**

Baker Test + 63

26 (Thr) Aboard USS Pensacola with working parties.
Film Badge exposure data: **Gamma = .01 R & Beta = .01 R**

27 (Fri) USS Haven (AH-12) Departed Kwajalein Atoll for Majuro Atoll with a USO show aboard. 1809 Hrs.

28 (Sat) USS Haven Arrived and anchored in Majuro Atoll. 1026 Hrs.
(Spent the day on R&R on Majuro Island with six other RAD-SAF Monitors).
Viewed USO Show aboard the USS Haven (AH-12). 2000 Hrs.

29 (Sun) USS Haven (AH-12) Departed Majuro Atoll for Kwajalein Atoll. 1616 Hrs.
30 (Mon) USS Haven (AH-12) Arrived and anchored in Kwajalein Atoll in Anchorage Able, Berth 29 at 0905 Hrs.

OCT 1946

Baker Test + 68

1 (Tue) Aboard USS Fallon and USS Conserver with working parties.
Film Badge exposure data: **Gamma = .16 R & Beta = .30 R**

3 (Thr) Tec-4. B.H. Caldwell III, RA 18 243 639, USA, having completed temporary duty with the Radiological Safety Section, JOINT TASK FORCE - ONE.
1400 Hrs: Transfered by motor launch to the Island of Kwajalein for air transportation to US Army Base, Oakland, California.

SUMMARY of Total (*ESTIMATED*) Radiation Dose:
(1 July through 2 October 1946)
(94 days Total Exposure)
Tec. 4, Boley H. Caldwell III, RA 18 243 639, CE, U.S. Army

1. Total Film Badge exposure dose * Gamma = .540 R & Beta = .530 R
2. Total *NTPR Caculated Dose* * Gamma = 1.088 R & Beta = ? R
3. *NTPR Caculated dose* for USS Haven * Gamma = .430 R & Beta = ? R
4. *NTPR Caculated dose* for USS Suncock * Gamma = .730 R & Beta = ? R

• • • 2.788 R Gamma & .530 R Beta Plus • • •

6 (Sun) Departed Kwajalein Island via C-54 aircraft o/a 0900 Hrs. Landed at Johnson Island for a refueling & rest stop.

6 (Sun) Arrived Hickam Field, Territory of Hawaii, for rest stop & custom inspection.

7 (Mon) Departed Hickam Field, Territory of Hawaii, o/a 0830 Hrs.

8 (Tue) Arrived U.S. Army Air Base at Fairfield, California, o/a 0900 Hrs. Traveled to Building #2001 Oakland Army Base, California, in an MP staff car arriving o/a 1330 Hrs.

10 (Thr) Departed San Francisco, California, for Los Alamos, New Mexico.

11 (Fri) Arrived Los Alamos, New Mexico.

NOV 46

24 Discharged from U.S. Army at Fort Bliss, Texas.

Addendum to December 11, 1985, statement given during the hearing of the Senate Veterans Affairs Committee on "Operations Crossroads" by LTC(Ret) Boley H. Caldwell III, U.S. Army, from the National Association of Atomic Veterans:

1. As my grandaughter often refers to the things in the past, the technology used at Crossroads was "Antique and Pre-Historic".

2. The the individuals of the present generation doing the analysis in the GAO leave little hints in their reasoning process of their modern television, plastic, atomic, NASA, computer, and hand held caculator upbringing. They fail to remember:

a. Crossroads was a Joint Military Services Operation in the post World War II era not a controlled laboratory experiment or a NASA space flight. It was the era of electronic vacuum tubes, hard wire electronics, + or- 5% electronic components, slide rules, cellophane, paper covered film badges, and the nickle a pack cigarettes. The film shown to the committee was a PR film actually made on Queen Day and during practice runs nearly a week before Test Able and not as news coverage for TV release the next day which is so common to todays generations.

b. Water proofing technology for spare parts was to wrap them in heavy brown paper and dip them two or three times in olive drab colored wax to provide a moisture proof cover. The wax coverings soaked up radioactivity like they were sponges.

c. Waterproofing of film badges and dosemeters was accomplished by placing them in condoms and tying a knot in the open end. Not the "sealed in plastic" type referred to in the GAO report. Film badges were transported through out the radioactive zone in brown paper envelopes and were not always stored in a refrigerated invironment as indicated in the GAO and DNA testimony.

d. Radiation fields were plotted on manual plotting boards using "Tote Boards". No real time situations could be displayed because of the time lag resulting from the communication system. Caculations were done with pencil and paper by hand.

e. Protective "Bootees" to keep radiation off of boots were old fashioned porous burlap sandbags and were not issued until the APL-27 decontamination station was established at Kwajalein Atoll the last week in August 1946. Protective clothing associated with the 1985 terminology was nonexistent. Chemical Corps coveralls were issued to members of the Initial Boarding Teams but the Target Ship Boarding parties used their fatigue uniforms and were issued cotton gloves. Later at Kwajalein Atoll Navy "Greens" (navy fatigue shirts and trousers), new russet combat boots, and porous cotton work gloves were issued for work on the target ships by ammunition removal and salvage boarding teams. Rebreather apparatus equipment was issued to enlisted monitors on the Initial Boarding teams for protection from poison gasses and not as a device to protect from inhalation of radioactive particles. The gas masks issued to some personnel were not effective for protection from breathing the ultrasmall radioactive particles.

f. Stay times were caculated from meter readings into minutes or hours using precomputed charts taped to the side of the survey meters. Cumulative stay times were at best determined by the pocket dosemeters not film badges.

g. The vast majority of bathing in the U.S. Navy was done by showers using salt water soap and sea water. Toilets on troop transports (APA's) were galvanized troughs on which the user placed two 2x4's across to sit on. Flushing was done periodically using sea water and never at the users convience or command. Entrance hatches were a foot above floor level to keep the ever present 2 or 3 inches of splattered flush water out of sleeping compartments.

h. Ordinary seaman on small ships and troop transports (APA's) slept on bunks made by stretching canvas inside a pipe frame and more often as not slept in the same clothes they had worked in that day. Showers were taken at the convenience of the ship's operational status.

i. At best the radioactive sea water used to wash down the target ships prior to boarding washed away the big hunks of radioactive particles of radioactive salt and coral sand but left a nice contaminated splattered layer of radioactive fission and plutonium particles embedded in the paint, rope, canvas, trash, and wooden decks.

j. The Navy's solution to "decontamination" was a "Clean sweep down fore and aft, and take all trash to the fantail". When that did not work scrub with sand, coffee grounds, ground coconut hulls or spray with acid or foam then rinse with more radioactive water. The effectiveness of these procedures is reflected in the fact that all but 12 of the target ships used at Crossroads had to be sunk because of the danger they posed to human health.

k. Because of the random method of issuing film badges, the lack of complete data on many film badges, the small number of film badges used to cover the total number of individuals exposed, that only gamma and beta levels were measured by film badges, and the uneven distribution of radioactive material on target ships; the use of film badge data by the Defense Nuclear Agency to determine individual dose levels is absolutely unrealistic and very inaccurate.

3. For the above mentioned reasons and many many other reasons, it is most improbable and very unrealistic to even consider that the alpha, beta and/or gamma "Total Dose" for any individual can be reconstructed with meaningfull accuracy by any individual or agency at this late date given the surviving data points.

Boley H. Caldwell III, LTC(Ret), U.S. Army
National Association of Atomic Veterans

Senator CRANSTON. Mr. Guarisco.

STATEMENT OF ANTHONY GUARISCO, AN OPERATION CROSSROADS PARTICIPANT AND DIRECTOR OF THE INTERNATIONAL ALLIANCE OF ATOMIC VETERANS, TOPOCK, AZ

Mr. GUARISCO. Thank you much, Senator Cranston, and members of the committee.

I would like to begin by thanking the GAO for their study and their report. We think it is very significant, and we think that it is a door that has been pushed open, and the atomic veterans will take advantage of that and push the door further open and be able to present even more evidence for what we consider to be a conspiracy by the DNA to conceal the true facts of what happened to participants at Operation Crossroads.

As the director of the International Alliance of Atomic Veterans, and as one of the few surviving victims of the insanity of Operation Crossroads, I feel very fortunate to be able to speak here today.

When Dr. Stafford L. Warren, chief of the radiological monitoring section of Operation Crossroads died, his family donated his private collection of declassified formerly secret and top secret documents to the University of California at Los Angeles. My wife Mary and I researched that collection from the UCLA research library special collections, and on May 24, 1983, I presented that collection of papers, along with the Arjun Makhijani and David Albright report on Crossroads to the House Veterans Affairs Committee.

Dr. Warren's private collection of papers is a voice from the grave directed straight at the Defense Nuclear Agency, who would have us believe that being involved in Operation Crossroads was a harmless stroll in the park. Dr. Warren, who spent countless nights, sleepless nights without sleep, haunted by the knowledge that atomic veterans of Crossroads were suffering and dying from their involvement in these nuclear explosions, made damn sure that he had a way to speak out against the Department of Defense, the DNA, and the nuclear weapons industry after his death.

At Bikini Atoll, he was threatened with court-martial if he did not keep silent concerning the grave dangers to the personnel in the Bikini Lagoon after Able and Baker detonations. Nevertheless, he persisted with his warnings until he convinced Admiral Blandy, commander of the Joint Task Force 1, to shut down Operation Crossroads before the third test, code named Charlie, was detonated.

Because of the time element here, I am not going to go more into my written detail, because I am sure it will appear—I mean, into my testimony, because I am sure it will appear as I have turned it in. So therefore, what I would like to do is spend the little bit of time here that we have left to talk a little bit about my involvement and two of my shipmates who are here with me today from the U.S.S. LST-388. We spent approximately 67 days in the Bikini Lagoon. We were the only ship that had 31 people who were on that island all the time. I have never seen any mention about the contaminated island itself, which was doused by huge amounts of radioactive water from the explosion, besides the water that went over the island from the rise in the water level that completely covered the island.

So if you want to talk about plutonium, let us talk about what was on the island itself, and let us consider the thousands of men who went back on that island for recreation, and the 31 of us who were on that island for 24 hours a day, and within 1 mile of the epicenter of both of those detonations.

I think it is very important that, for one thing, we realize that every one of us that served at Operation Crossroads were dedicated patriots. We still are to this day. We still—we believe that we should have a strong defense. But in the rest of my report here that will be—I will not speak about, is that it is our direct belief, the International Alliance, with the connection with the Defense Nuclear Agency and the military weapons industry, and we believe they are both working in tandem to cover up what has happened to the atomic veterans in order to perpetuate a continuous nuclear arms race.

I think that one thing is very important that we should bring up here is the fact that when the Defense Nuclear Agency commented this morning that they would bring in reports from a deck log as evidence, that I state to you emphatically right now that there are three members of the U.S.S. LST-388 that are here to tell you that our deck logs have been altered. Our deck logs have been altered to show that we were not in the Bikini Lagoon within 5 days after the Baker detonation, and that is a false statement. We were there. We seen the *Nigada*, which took 5 days to sink. We seen it listing over, and we seen it when it was gone—I mean, we did not see it after it had expired. And we know that it took 5 days for that particular ship to sink.

So I want to be on record here as saying that we believe that the records not only—the deck logs not only of the LST-388, but other ships, have been altered.

I would also like to say that in my position on the island at the—working at the officers' area, I was privy to a lot of conversations that went on over there, and again I would like to state that, having been in the officers' area, I cannot speak highly enough of the officers who did serve at Operation Crossroads. I can tell that they shared a very deep concern for the men who were under their commands. I can tell you that they were all very anxious to get off, out of Bikini after August 7. My ship stayed there until the very end of September, and when we left, we left with 475 tons of radioactive equipment that we took back to Pearl Harbor.

There is a lot that has to come out about Operation Crossroads, and the atomic veterans want to be part of putting that true historical record together, and we are hoping that your committee will include one person from NAAV, NARS, and the International Alliance of Atomic Veterans, to be part of a Government-funded committee that can help to bring—have some meaningful input representing the atomic veterans.

And as a person who has been active in this issue for over 10 years, and as the past national research director for the National Association of Atomic Veterans, and as the director of the International Alliance of Atomic Veterans, I would strongly ask to be considered for one of those positions.

I thank you very much for your time. I thank you very much for giving us the opportunity to speak here, and I hope that when the true story is written of the atomic veterans that it will not be without input from the surviving people that took part in this insanity.

Thank you very much.

Senator **Cranston**. Thank you very much, Mr. Guarisco.

[The prepared statement of Mr. Guarisco follows:]

TESTIMONY OF ANTHONY GUARISCO
IAAV DIRECTOR
INTERNATIONAL ALLIANCE OF ATOMIC VETERANS

BEFORE THE
COMMITTEE ON VETERANS AFFAIRS
UNITED STATES SENATE
DECEMBER 11, 1985

SENATOR CRANSTON, AND MEMBERS OF THE COMMITTEE:

AS THE DIRECTOR OF THE INTERNATIONAL ALLIANCE OF ATOMIC VETERANS (IAAV), AND AS ONE OF THE FEW SURVIVING VICTIMS OF THE INSANITY OF "OPERATION CROSSROADS," I FEEL VERY FORTUNATE TO BE ABLE TO SPEAK HERE TODAY. WHEN DR. STAFFORD L. WARREN, CHIEF OF THE RADIOLOGICAL MONITORING SECTION OF "OPERATION CROSSROADS" DIED, HIS FAMILY DONATED HIS PRIVATE COLLECTION OF DECLASSIFIED FORMERLY SECRET AND TOP SECRET DOCUMENTS TO THE UNIVERSITY OF CALIFORNIA AT LOS ANGELES. MY WIFE MARY AND I RESEARCHED THE WARREN COLLECTION FROM THE UCLA RESEARCH LIBRARY "SPECIAL COLLECTIONS" AND ON MAY 24, 1983, I PRESENTED THAT COLLECTION OF PAPERS ALONG WITH THE DR. ARJUN MAKHIJANI AND DAVID ALBRIGHT REPORT ON CROSSROADS TO THAT HOUSE VETERANS AFFAIRS COMMITTEE. DR. WARREN'S PRIVATE COLLECTION OF PAPERS IS A VOICE FROM THE GRAVE, DIRECTED STRAIGHT AT THE DEFENSE NUCLEAR AGENCY (DNA) WHO WOULD HAVE US BELIEVE THAT BEING INVOLVED IN "OPERATION CROSSROADS" WAS A HARMLESS STROLL IN THE PARK. DR. WARREN, WHO SPENT COUNTLESS NIGHTS WITHOUT SLEEP, HAUNTED BY THE KNOWLEDGE THAT ATOMIC VETERANS OF "CROSSROADS" WERE SUFFERING AND DYING FROM THEIR INVOLVEMENT IN THOSE NUCLEAR EXPLOSIONS, MADE DAMN SURE HE HAD A WAY TO SPEAK OUT AGAINST THE DEPARTMENT OF DEFENSE (DOD), THE DNA, AND NUCLEAR WEAPONS INDUSTRY AFTER HIS DEATH. AT BIKINI ATOLL HE WAS THREATENED WITH "COURT-MARTIAL" IF HE DID NOT KEEP SILENT CONCERNING THE GRAVE DANGERS TO PERSONNEL IN THE BIKINI LAGOON AFTER THE ABLE AND BAKER DETONATIONS.

NEVERTHELESS HE PERSISTED WITH HIS WARNING UNTIL HE CONVINCED ADMIRAL BLANDY, COMMANDER OF JOINT TASK FORCE ONE TO SHUT DOWN "OPERATION CROSS ROADS" BEFORE THE THIRD TEST, CODE NAMED; "CHARLIE" WAS DETONATED.

THE QUESTION WE SHOULD BE ASKING HERE TODAY IS WHY HAS THE DNA PERPETRATED A CONSPIRACY TO CONCEAL DECLASSIFIED INFORMATION SUCH AS WE FOUND IN THE WARREN COLLECTION? WHY HAS EVERY ADMINISTRATION FROM THE TIME THAT THESE DOCUMENTS WERE DECLASSIFIED IN THE 1960'S PASSED THIS CONSPIRACY FROM ONE ADMINISTRATION TO THE OTHER? THE INTERNATIONAL ALLIANCE OF ATOMIC VETERANS IS ASKING FOR A PASSAGE OF A LEGISLATIVELY CREATED PRESUMPTION OF SERVICE-CONNECTION. DISEASES THAT HAVE A SCIENTIFIC BASED RELATIONSHIP TO RADIATION EXPOSURE SHOULD BE PRESUMED TO BE SERVICE-CONNECTED. PRESENTLY THE VETERANS ADMINISTRATION (VA) EVALUATES A VETERANS CLAIM FOR DISABILITY AND PROPER HEALTH CARE ONLY ON THE INFORMATION HANDED DOWN FROM THE DNA, DOE OR REECO, ANOTHER SUB-CONTRACTOR THAT HAS FOR YEARS BEEN IN BED WITH THE DOD AND DOE. THE DOD AND DOE ACT ON THE ORDERS OF THE PENTAGON WHICH OPERATES LIKE A LARGE CORPORATION ITSELF, WORKING IN TANDUM WITH A CORRUPT MILITARY NUCLEAR-INDUSTRIAL COMPLEX THAT HAS BEEN ALLOWED TO STEAL BILLIONS OF DOLLARS OF TAXPAYERS MONEY.

ITS ALWAYS BEEN COMMON PRACTICE FOR SOME RETIRING MILITARY OFFICERS TO SLIP RIGHT INTO A HIGH PAYING JOB WITH THE SAME NUCLEAR WEAPONS INDUSTRY THEY WERE CONNECTED WITH WHILE SERVING IN THE MILITARY. OR THEY MAY RETIRE INTO AN APPOINTED POSITION OF POWER IN GOVERNMENT LIKE NATIONAL SECURITY ADVISOR McFARLANE AN EX-MILITARY OFFICER. TODAY IN OUR PRESENT CONSERVATIVE ADMINISTRATION WE HAVE A LARGE NUMBER OF EX-MILITARY OFFICERS, AND HIGH RANKING BUSINESS EXECUTIVES FROM THE NUCLEAR INDUSTRY, SUCH AS BECHTEL CORP. FOR EXAMPLE, SECRETARY OF DEFENSE WEINBERGER AND SECRETARY

OF STATE SHULTZ, PLUS 4 OR 5 MORE MEMBERS OF BECHTEL ARE NOW IN POSITIONS OF POWER IN OUR GOVERNMENT TO PERPETUATE A NEW PHASE OF A PORK BARREL NUCLEAR ARMS RACE LIKE STAR WARS THAT IS SUCKING OUR ECONOMY DRY AND SQUANDERING MONEY AWAY THAT COULD BE BETTER USED TO TAKE CARE OF A THIRTY-NINE YEAR OLD PROBLEM THAT PEOPLE WITH THE SAME WAR-LIKE BUSINESS MENTALITY CREATED. NOW YOU MAY ASK WHAT HAS THIS TO DO WITH ATOMIC VETERANS. IT HAS EVERYTHING TO DO WITH ATOMIC VETERANS.

IN 1961 PRESIDENT EISENHOWER COINED THE PHRASE "MILITARY-INDUSTRIAL COMPLEX" TO DESCRIBE THE CLOSE TIES BETWEEN GOVERNMENT AND BUSINESS IN AMERICA -- A SYMBOLIC RELATIONSHIP THAT CAN LEAD TO THE KIND OF DANGEROUS MUTUAL DEPENDENCY THAT HAS NOW DEVELOPED BETWEEN THE PENTAGON, OUR GOVERNMENT AT THE HIGHEST LEVEL, AND THE NUCLEAR WEAPONS INDUSTRY. TODAY THE PENTAGON, THE NUCLEAR WEAPONS INDUSTRY AND OUR CONSERVATIVE REAGAN ADMINISTRATION ARE ALL TOGETHER IN THE BUSINESS OF SELLING RADIATION, SINCE THEIR ALL IN THE BUSINESS OF SELLING RADIATION, THE LAST THING THEY WANT TO HEAR ABOUT, OR HAVE HANGING AROUND IS A SMALL GROUP OF RADIOACTIVE ATOMIC VETERANS TO REMIND THE AMERICAN PEOPLE OF PAST ATROCITIES COMMITTED AGAINST THEM. WE'RE BAD FOR BUSINESS -- NOW ENTER THE CHAMPION OF THE NUCLEAR-INDUSTRIAL COMPLEX WITH A STRONG VESTED INTEREST, WHO HAS RECEIVED MORE MONEY FROM THE MILITARY-INDUSTRIAL COMPLEX THEN ANY OTHER SENATOR ... SENATOR JOHN WARNER INTRODUCED THE "WARNER AMENDMENT" THAT WAS PASSED BY THIS SENATE AND SIGNED INTO LAW BY PRESIDENT RONALD REAGAN. WHY WOULD THE REAGAN ADMINISTRATION REQUEST SENATOR WARNER TO INTRODUCE AN AMENDMENT THAT SMACKS OF FASCISM AND DEPRIVES THE ATOMIC VETERANS OF THEIR LEGAL RIGHT TO BRING COURT ACTIONS AGAINST THE NUCLEAR WEAPONS INDUSTRY? EVIDENCE FROM THE STAFFORD WARREN DOCUMENTS PROVE THAT THE NUCLEAR WEAPONS INDUSTRY HAD A COMPLETE DON'T GIVE A DAMN ATTITUDE CONCERNING THE ACCURACY

OF THE RADIOLOGICAL SAFETY MONITORING EQUIPMENT THAT WAS USED AT OPERATION CROSSROADS. CONSEQUENTLY, PERSONNEL WERE EXPOSED FOR LONG PERIODS OF TIME TO MUCH MORE PENETRATING IONIZING RADIATION THEN INSTRUMENTS OF VERY LOW BETA-SENSITIVITY WERE ABLE TO RECORD.

WHEN ONE LIVES IN A CAPITALISTIC SOCIETY WITH A RIGHT-WING ADMINISTRATION IN OFFICE, PERHAPS ATOMIC VETERANS SHOULD NOT EXPECT CIVIL RIGHTS TO PREVAIL OVER PROFITS. BY SIGNING THE WARNER AMENDMENT INTO LAW, IN THE EYES OF ATOMIC VETERANS, PRESIDENT RONALD REAGAN HAS VIOLATED HIS OATH OF OFFICE, TO PROTECT THE RIGHTS OF AMERICA'S CITIZENS. PERHAPS WE SHOULD HAVE EXPECTED THAT THIS CONSERVATIVE CONTROLLED SENATE WOULD ASSUME THE POSITION THAT ITS CAPITALISTICALLY MORE FRUGAL TO STRIP AWAY THE RIGHTS OF ITS CITIZENS RATHER THAN UPHOLD THEIR RIGHTS FOR REDRESS AGAINST AN OBVIOUSLY GUILTY NUCLEAR WEAPONS INDUSTRY.

STAFFORD WARREN WAS ABLE TO ACCOMPLISH FROM THE GRAVE, WHAT HE FELT WAS NOT POSSIBLE WHILE HE WAS ALIVE. AND WE THE ATOMIC VETERANS CAN CERTAINLY UNDERSTAND WHY HE DID NOT WANT TO TAKE ON A NUCLEAR WEAPONS INDUSTRY THAT HAD GAINED A STRONG CONTROLLING INFLUENCE NOT ONLY OVER OUR CONGRESS BUT ALSO OUR MILITARY. HE LEFT US TWO THINGS. HE LEFT US THE UNDERSTANDABLE EVIDENCE THAT NUCLEAR TECHNOLOGY CAN AND WILL TURN AMERICA'S JUSTICE SYSTEM AND ITS CONGRESS AGAINST ITS OWN CITIZENS. STAFFORD L. WARREN ALSO LEFT EACH OF US A WARNING.

THANK YOU

Mr. GUARISCO. Oh, may I say one other thing——

Senator CRANSTON. Yes.

Mr. GUARISCO [continuing]. Senator?

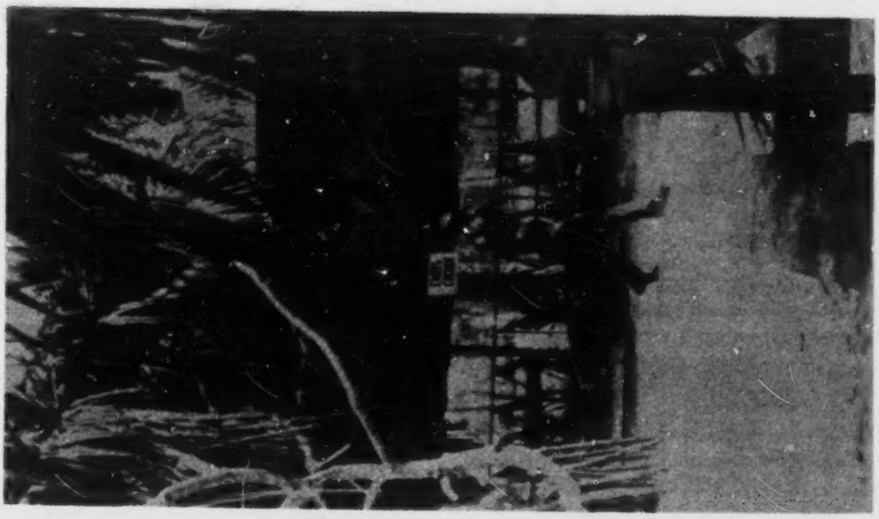
I have some pictures here that I took myself relating to Operation Crossroads. I have a picture here of three of my shipmates taken after Bikini—I mean, after Baker, standing beside a boat that was blown up on the beach, and I would like you to look at what they are wearing. One person is standing barefooted. Another person, the other two people are standing without shirts.

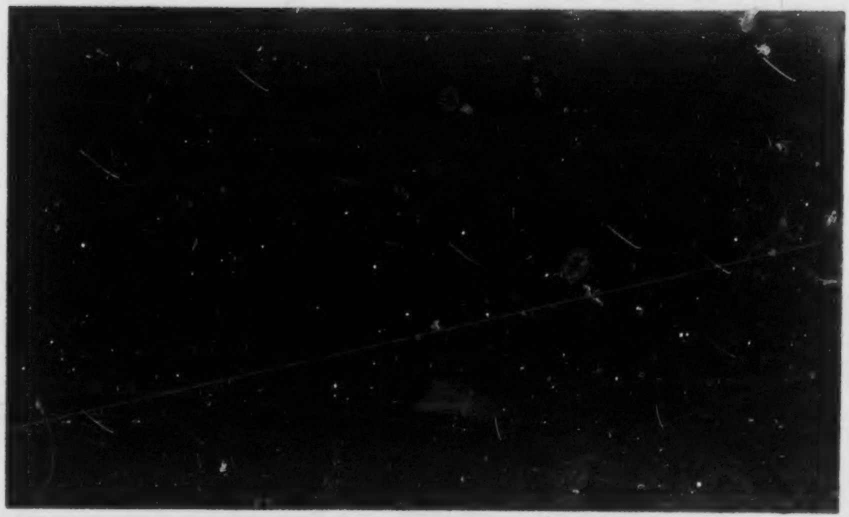
And this was after Baker, this was on the island of Bikini that no one has ever spoke about how they decontaminated that island, because it was never decontaminated.

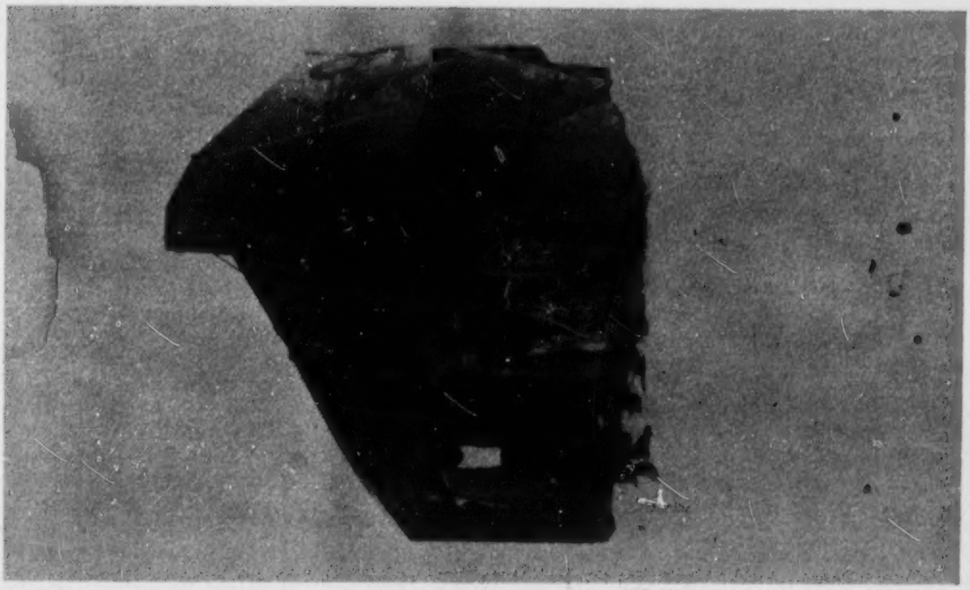
I have other pictures here I would like to give you for the record. I hope that I would be able to have them back, of course, and I thank you very much, sir.

Senator CRANSTON. Thank you very much. We will accept them and endeavor to get them in the record and also back to you.

[The following pictures were supplied for the record:]







Senator **Cranston**. You mentioned two shipmates who are here, two shipmates of yours, and if you would, and if they would have no objection, if you could give their names for our committee record?

Mr. **Guarisco**. Yes, sir. I would be glad to. I did not do it because of the time; I did not want to take up any more further time than I had to. But they are Mr. Cisco Napier, from Ohio, and Mr. Billy Hendrickson, from Oklahoma.

Senator **Cranston**. Thank you very much.

Mr. **Guarisco**. Yes, sir. Thank——

Senator **Cranston**. I now have about a dozen questions I want to put to the three of you. That means 36 answers, so in many cases you can answer just yes or no, and if you need a bit more than that, please try to be very brief so we can conclude with you and get back to the DNA witnesses.

First of all, and if each of you would answer, after either of the Operation Crossroads shots, were you personally on a target ship? Colonel.

Colonel **Caldwell**. Yes.

Mr. **Guarisco**. Yes.

Mr. **Thompson**. Yes.

Senator **Cranston**. All three of you were.

Would you each very briefly state what was your assigned task on the ship or ships?

Colonel **Caldwell**. I was the enlisted radiological safety monitor on initial boarding team 10. My primary duty was to go aboard target ships, establish stay times and conduct radiological surveys.

Senator **Cranston**. What ship were you on?

Colonel **Caldwell**. Which target ship?

Senator **Cranston**. Target ship, yes.

Colonel **Caldwell**. I was on 11 different target ships following both Able and Baker tests, and over 30 target ships during the stabilization period, sir.

Senator **Cranston**. Eleven different ones.

Colonel **Caldwell**. Yes, sir.

Senator **Cranston**. Mr. Thompson.

Mr. **Thompson**. I was on the *New York* and I went on there because the officer, my division officer, suggested I go with him, and I do not believe it was a suggestion. In fact, I think I had to go.

But anyway, I was on the *New York*.

Senator **Cranston**. What was your assigned task?

Mr. **Thompson**. Well, you might say I was chief stooge. I was along for the ride.

Senator **Cranston**. Mr. Guarisco.

Mr. **Guarisco**. Our ship was beached up on Bikini for the complete operation, and after Baker detonation, some of the ships were sprawled out on the beach, and myself and some of my shipmates went inside these ships that were flooded with water——

Senator **Cranston**. Was this a target ship you are——

Mr. **Guarisco**. These were target ships, yes, sir.

And we went in there, and what we did was—is we took the fans, the oscillating fans that were on these ships and took them over and put them on our ship and plugged them in, because it was so terribly hot over there, hot and humid at Bikini.

About the time we got ready to leave Bikini, somebody came through and took all the fans out and deep-sixed them and said that we could not have them because they were part of ship's company.

But I was on approximately three of those ships, because we were never, ever warned of the danger of those ships being contaminated in such a degree that we should stay off of them.

Senator **Cranston**. May I proceed with a question now?

Mr. **Guarisco**. Yes.

Senator **Cranston**. Each of you, what did you wear and how long were you on a target ship?

Mr. Guarisco.

Mr. **Guarisco**. I spent approximately 2 hours altogether.

Senator **Cranston**. What did you wear?

Mr. **Guarisco**. I had a pair of work pants, pair of—we used to call them browns, or greens. And I had on a T-shirt and shoes and stockings, and that was it.

Senator **Cranston**. No boots?

Mr. **Guarisco**. No, sir, no boots, no gloves, no safety——

Senator **Cranston**. No gloves?

Mr. **Guarisco** [continuing]. Equipment whatsoever.

Senator **Cranston**. No gloves?

Mr. **Guarisco**. No gloves. Nothing whatsoever.

Senator **Cranston**. Mr. Thompson, what about you? How long and wearing what?

Mr. **Thompson**. I was only on there approximately a half hour, and I had a chambray shirt on with regulation dungarees and a pair of socks and regulation shoes. Skivvies. But I did not have on a skivvy shirt, as I remember, because it is humid, and it was also hot, about like Washington in the summertime, and I do not remember wearing any more than I had to.

Senator **Cranston**. Colonel.

Colonel **Caldwell**. In the 90-some days I was there, Senator, several hundred hours, I would have to go through my statement and give you some estimate based on a study, but it was several hundred hours on target ships.

So far as protective clothing, I had a rebreather apparatus that was issued to me. The rebreather apparatus was issued to me not for radiation protection, as some people here today seem to think, but it was issued to protect me from poison gas when I went down in the holds of ships to take crews down there, and to do initial surveys before those crews came aboard.

Protective clothing included rubber gloves that came almost to your elbow, and the Chemical Corps coveralls. These were used by us, by boarding team members, and that is all I can testify to, until we were recovered to the *Haven* on the 11th of August. The change ship where the greens were issued that Mr. Guarisco mentioned did not come to Bikini until August 10, and did not go into operation till around August 12 or 13. It left again on the 23d and was set up at Kwajalein to help when the ships were taken there.

And in Kwajalein—I did not even know the change ship was ever in Bikini until I did some investigation. The the first time I was aboard her was after we were in Kwajalein.

There was never protective clothing, Senator, other than the navy fatigues, for work crews.

Senator CRANSTON. Let me——

Colonel CALDWELL. When you talk—all right.

Senator CRANSTON [continuing]. Let me ask——

Colonel CALDWELL. I am sorry, I am——

Senator CRANSTON. That is quite all right.

Colonel CALDWELL [continuing]. I am getting carried away, but I am trying to give you full and correct answers, sir.

Senator CRANSTON. I appreciate your thoroughness.

Let me ask you each this question now, starting with you, Colonel.

Did you ever touch railings or other target ship surfaces with your skin?

Colonel CALDWELL. Yes, sir.

Mr. THOMPSON. Yes, sir, with my hands.

Senator CRANSTON. Mr. Guarisco.

Mr. GUARISCO. Absolutely, yes.

Senator CRANSTON. Mr. Guarisco, did you see any dust or debris on the target ship that might have been radioactive?

Mr. GUARISCO. Yes, sir, I did. I seen a lot of it. I seen a lot of it also on the island. It was picked up by the equipment that was rolling by there, and by equipment I am talking about trucks and jeeps that were there to take care of the needs of the—that were there on the island. I think that the island of Bikini itself has been the one thing that has been overlooked over here in this whole presentation by the Defense Nuclear Agency.

And I might add, I will be real quick, and I know we are short on time, but I want to make—I want to impress on you that the atomic veterans do not believe the Defense Nuclear Agency. I mean, we are tired of listening to their soft, soothing don't-be-worried language. We are very concerned about ourselves; we are concerned about our genetically affected children; and we are very concerned that the official historical record of the atomic veterans that the Defense Nuclear Agency is pretending is—is presenting as facts is just very, very badly flawed, to be polite.

Senator CRANSTON. Thank you very much.

Mr. Thompson, what about dust and debris?

Mr. THOMPSON. Yes; I did see it on the target ship when I was on there, but I also seen it on a nontarget ship, which was mine.

On one occasion, we had to go up and clean the SK radar antenna because it was about to rust off, and so we went up there with wire brushes and zinc chromite and everything you need to do it, and our hands swelled up. And that is aboard a nontarget ship, the *Kenneth Whiting*.

Senator CRANSTON. And this was after those ships had been hosed down, Colonel, did you see dust or debris that presumably might have been contaminated when you were on board the ships?

Colonel CALDWELL. Yes, sir; I saw dust and debris, and I knew it was contaminated because I had the detection equipment to determine that it was radioactive, and I tried to stay out of it as much as possible, and keep my people out, Senator.

Senator CRANSTON. So you dispute the contention that it was all washed off?

Colonel **Caldwell**. Senator, I think there is plenty of evidence in the Navy's Directory of Ships' Materiel and Bureau of Ships reports concerning the contamination of these ships. There are three volumes that have been written on it. There were tests run where they had to mill nearly a quarter of an inch of wood off of decks to get rid of the contamination. They had to remove all the paint and undercoating and get down to bare metal to get rid of the majority of the alpha contamination.

Senator **Cranston**. Well, what I was really asking, was there loose debris that apparently was not washed off by the hosing?

Colonel **Caldwell**. Senator, I have taken hundreds of men through a decontamination ship in Kwajalien weeks and months after they washed them down and we moved them to Kwajalein, and it rained on them almost every night at 8 o'clock. Men still came off those ships with contamination in their hair, on their face, on their hands, in the genital area.

I do not think washing them down did very much to remove the alpha contamination. I definitely say washing down with radioactive seawater did not greatly reduced any alpha radiation on those ships.

Senator **Cranston**. Do you know if that visible contamination was recorded in any reports?

Colonel **Caldwell**. Visible contamination?

Senator **Cranston**. Well, what you are referring to, what you saw on people's hands and hair?

Colonel **Caldwell**. It is invisible. You did not see it. You could have it on you right now and you would not know it, sir. Radiation is not visible.

Senator **Cranston**. How were you able to state, then, that it was there?

Colonel **Caldwell**. Because I had an X-263 Geiger-Mueller counter that detected it, and I had an X-247 ion chamber detector.

Senator **Cranston**. Well, then, was that entered into records, the fact that you had detected that?

Colonel **Caldwell**. Not at the change ship, no, sir, because a man was sent back to shower. I did detect it on the ships, and it was entered in the record as radiological safety monitor record sheets.

Senator **Cranston**. Was it entered into any records that you found it on individuals?

Colonel **Caldwell**. That we found it on individuals?

Senator **Cranston**. Yes, with your tests?

Colonel **Caldwell**. I know it was entered in the record in the form of messages from time to time, reports in areas that were having problems, such as the PGM-24. It was entered in the record there, sir. They stated that they had some 400 percent overdose at one time.

Senator **Cranston**. Thank you.

Did any of you see any warning signs, or were you otherwise told, that certain areas on contaminated ships or on your own ship were particularly hot?

Mr. **Guarisco**. No, sir, I never have. And I think that there is one place that was very, very hot on every ship that was at Crossroads.

Senator CRANSTON. Mr. Guarisco, I have got to ask you for concise answers. You did not see any such warning?

Mr. GUARISCO. No.

Senator CRANSTON. You were not told?

Mr. GUARISCO. No, sir, we were not.

Senator CRANSTON. Mr. Thompson.

Mr. THOMPSON. No.

Senator CRANSTON. Mr. Caldwell.

Colonel CALDWELL. Yes, there is evidence that there were signs, and I did see some, and I did mark areas with a large piece of chalk which is what I used, sir.

Senator CRANSTON. Next, to you, Colonel, were you assigned a film badge for any of the days you worked on one of the contaminated ships?

Colonel CALDWELL. Yes, sir, I was required to wear a film badge every time I went out, sir.

Senator CRANSTON. Every time?

Colonel CALDWELL. Yes, sir. However, the Defense Nuclear Agency can only locate about 13 out of 70 badges on me, sir.

Senator CRANSTON. Mr. Thompson, did you wear a badge?

Mr. THOMPSON. No, sir, I did not.

Senator CRANSTON. Never?

Mr. THOMPSON. Never.

Senator CRANSTON. Mr. Guarisco.

Mr. GUARISCO. No, sir, I never did, and neither did anyone else on my ship.

Senator CRANSTON. Let me ask you this question now, Mr. Guarisco. Did you or others eat or smoke while on board a contaminated ship?

Mr. GUARISCO. Well, I never was a drinker or a smoker, so that—I did not, but I——

Senator CRANSTON. You have to be an eater. Did you eat on the ships?

Mr. GUARISCO. No, I did not, but I know that there were men that were aboard my ship that had gone on these ships with me that did smoke. I did not ever see any of them eat, but I did see them smoking.

Senator CRANSTON. Thank you.

Mr. Thompson.

Mr. THOMPSON. Yes, sir, I smoked.

Senator CRANSTON. On the ship?

Mr. THOMPSON. Yes.

Senator CRANSTON. Any eating?

Mr. THOMPSON. No.

Colonel CALDWELL. At the time, I was not a smoker, Senator. I did take a drink aboard ship, and I will have to admit, I did eat onboard from time to time parts of my K-rations that I carried with me, sir.

Senator CRANSTON. Did you or others swim in the lagoon after the test shots?

Colonel CALDWELL. After Test Able, I swam in the lagoon. After Test Baker, you could not get me in the water, Senator.

Senator CRANSTON. Were you warned about swimming?

Colonel **Caldwell**. Yes, sir, after Test Baker, not after Test Able. There was no problem after Test Able.

Senator **Cranston**. Well, did you see any other people swimming after Baker?

Colonel **Caldwell**. No, sir. If I had, I would have followed procedures that I had been given.

Senator **Cranston**. Mr. Thompson, did you, or others that you saw, swim?

Mr. **Thompson**. No, not after Baker. We did after Able, but not after Baker.

Senator **Cranston**. Were you warned not to after Baker?

Mr. **Thompson**. Yes, we were.

Senator **Cranston**. Mr. Guarisco.

Mr. **Guarisco**. I seen a lot of people swimming in the lagoon after the Able detonation. I was a lifeguard at the officers' beach, and I did not see any officers——

Senator **Cranston**. What about after Baker?

Mr. **Guarisco**. Not after Baker. No.

Senator **Cranston**. No swimming, then?

Mr. **Guarisco**. No.

Colonel **Caldwell**. Sir, it was a very serious offense, a court-martial offense, to be caught swimming after Baker test.

Senator **Cranston**. While you were assigned to Operation Crossroads, Colonel, did you or others, to your knowledge, have any open cuts or other skin wounds?

Colonel **Caldwell**. Yes, sir, we would get cut from time to time. Working parties get cut, and they were cleaned. And there were not any serious injuries.

Senator **Cranston**. Do you know if there is any entry into medical records in regard to that?

Colonel **Caldwell**. I rather doubt it, sir. Most of them were done on the ship, sir.

Senator **Cranston**. What about you, Mr. Thompson?

Mr. **Thompson**. Yes, I have seen others, and in fact, I remember having one myself that I went to sick bay and they treated with either mercurochrome or merthiolate. But it was still just sick bay. It would not be in the record.

Senator **Cranston**. Mr. Guarisco.

Mr. **Guarisco**. I do not remember having any open cuts, but I do know that every bathroom on every ship that was in the lagoon was a dangerous place for open parts of the body, because the troughs that men had to sit down and have their bowel movements continually had water rushing through it that came from the contaminated lagoon. And also the urinals that we used in these heads, as they are called, there was a large danger that existed by ships such as mine that when we landed on the beach, we punched a hole in the bottom of it and filled up part of the ship with contaminated water from the lagoon.

There is nothing in our deck logs about that, but yet there is three people right here today that could testify to that.

Senator **Cranston**. Mr. Guarisco, did you receive any special directions for washing, laundering your clothes after working on contaminated ships?

Mr. **Guarisco**. No, sir, because I was not working on any ships. I was on the island, I did become very ill within a few days after the second detonation. I was—had complete nausea, I was urinating blood, throwing up. I spent 4 or 5 days in that condition, 2 of which were very severe. I was put aboard a hospital ship when I was at—in Pearl Harbor when I got back. I had examinations there. I have tried six times, using the Freedom of Information Act, to get evidence about that, and I have not been able to do that.

Senator **Cranston**. Thank you very much.

Mr. Thompson, what about laundering your clothes?

Mr. **Thompson**. No, we were not given any special instruction. In fact, we had a laundry and they laundered everything together, so there was no instruction needed on my part, because I did not wash my own.

Senator **Cranston**. Was there any direction to you that you had to get your clothes laundered right after you were on a contaminated ship?

Mr. **Thompson**. None that I know of.

Senator **Cranston**. Colonel.

Colonel **Caldwell**. Instructions to me concerning that were twofold, Senator, one as a monitor and one as an enlisted man.

If my coveralls that were issued to me for protective clothing became contaminated, they could not be washed. We just threw them over the side, weighted them down, and threw them over the side.

My personal clothes were laundered on the *Haven*, sir, and if I changed clothes while I was out on a trip, I put them in my duffel bag, and they were washed at the *Haven*.

Senator **Cranston**. Were you required to shower right after you were on a contaminated ship?

Colonel **Caldwell**. Not until after we got to Kwajalein and had use of a change ship, sir. The APL-27, which was a decontamination barge, was set up for that.

As far as crews were concerned which lived on APA's and AP's, I have read records where they were set up as change ships, sir. I do not have any direct knowledge of that, though. As a member of the boarding team for 17 days, we lived on the *Suncock* and the AN-80 and we had no decontamination station other than a two-headed shower stall.

Senator **Cranston**. Mr. Thompson, were you required to shower, or did you shower, right after you were on a ship?

Mr. **Thompson**. No, sir, it was not either—I mean, there was no directive on it at all.

Senator **Cranston**. Mr. Guarisco.

Mr. **Guarisco**. No, sir, we were not able to shower more than twice a week because of the lack of fresh water.

Senator **Cranston**. Thank you very, very much.

Thank you all for your testimony, for your great helpfulness. I appreciate it immensely. You were great to come.

I now want to return briefly to representatives of DNA, and I thank you for waiting so long. I do not have too many questions for you, but I do have just a few more.

[Pause.]

Senator **Cranston**. Thank you very much for being with us for a bit more.

I want to first ask this question. Are there any classified reports pertaining to Operation Crossroads?

Mr. **Boren**. The only ones that would remain classified would be radiochemical data and some underwater blast data which are still confidential. But the radiochemical data has been incorporated into our internal dose reconstruction. The blast data, of course, has no relevance to the radiological situation.

Senator **Cranston**. How many such reports are there?

Mr. **Boren**. Each target vessel had a blast data report, which are now regarded as confidential. The radiochemical data, I am not entirely sure, sir.

Senator **Cranston**. Do you know when they were last considered for downgrading of classification?

Mr. **Boren**. I looked into this in 1984. The radiochemical data will not be downgraded, sir, because you can use that information to create a nuclear device. The plutonium mixture and so forth is very important.

The blast data was considered, and, since it was not relevant for anybody's radiological exposure, we decided to keep it classified.

Senator **Cranston**. Who has——

Mr. **Boren**. The blast data is useful, sir, to study weapons effects, and underwater pressure effects and such.

So I think that both are properly classified, sir, and we did look at them.

I would also like to point out that all the information that was unclassified and classified was made available to GAO. So they were working with the same thing we were.

Senator **Cranston**. With regard to the underwater effects, is there a reason for keeping those classified?

Mr. **Boren**. Yes, sir. It is valuable weapons effects data. It is——

Senator **Cranston**. Who has responsibility for declassification?

Mr. **Boren**. In weapons effects, for nuclear effects, it is Defense Nuclear Agency. Also, the Navy has a role in guarding its own weapons effects data on ships.

Senator **Cranston**. General Pickitt, would you institute a review of whether or not these need to be kept—all need to be kept classified?

General **Pickitt**. Yes, sir.

Senator **Cranston**. I would appreciate that.

General **Pickitt**. Yes, sir.

Senator **Cranston**. And report back to us on that?

General **Pickitt**. Yes, sir.

Senator **Cranston**. Thanks.

[The following information was subsequently supplied for the record:]

A review of Crossroads reports reveals that 194 reports remain classified Secret or Confidential, of which 34 are also classified as Restricted or Formerly Restricted Data. Of these 194 documents, 176 appear to be blast and overpressure data on ships and other military equipment. Another 18 reports deal with one of two categories. Some are initial radiation readings, radiochemical analysis, or other information which remain classified because they provide important bomb design information. The rest are final reports which provide no useful information in determining radiation exposures, thus they were not downgraded because of their limited usefulness.

All of these reports will be reevaluated to see if their classification is still appropriate. A report on this effort will be provided to the Committee by September, 1986.

Senator CRANSTON. Would you please provide also for the committee all documents and other materials in the Defense Department or the Energy Department files or archives that pertain to the decision to terminate the operation?

General PICKITT. Yes, sir, I will.

Senator CRANSTON. Thank you.

[The following information was subsequently supplied for the record:]

The decision to end Crossroads occurred in two stages. First, was the decision of August 10, 1946 to cease decontamination efforts and release the majority of the task force back to the Navy for other activities. After August 10, all further work on the target vessels by Task Force Personnel was limited to recovery of instruments, limited surveys, salvage work and preparation for towing. This decision was made by the Task Force Commander. This decision came about after a request from the Director of Ship Material to the Chief of the Radiological Safety Section and the Commander of the Target Group for them to inspect decontamination operations. This inspection led to the discovery that alpha emmiters could be present throughout the target fleet, and that for the safety of the personnel, the decontamination work should stop. This possibility, coupled with the eminent departure of many of the scientists, produced an effective halt to the Operation.

Second, Test Charlie was cancelled on September 7, 1946. This was the third scheduled test which was a deep underwater explosion. Preparations for the test were underway in the western part of Bikini Atoll when word of the President's announcement arrived. His statement was:

"In view of the successful completion of the first two atomic bomb tests of Operation Crossroads and the information derived therefrom, the Joint Chiefs of Staff have concluded that the third explosion, Test C, should not be conducted in the near future. . . . The additional information of value expected to result from Test C is such that the joint Chiefs of Staff do not feel that completion of the test in the near future is justified."

Documents relating to these decisions are provided to the committee.

BOMBS AT BIKINI

The Official Report of Operation Crossroads

Prepared under the Direction of the
Commander of Joint Task Force One

by

W. A. Shurcliff

Historian of Joint Task Force One

1947
Wm. H. Wise & Co., Inc.
New York

Appendix 14

Test C (Cancelled)

Prior to its cancellation by the President, the proposed "Test C" was the center of much discussion. In this test an atomic bomb was to be exploded at great depth beneath the surface of the water.

Persons favoring holding such a test believed that it would produce an underwater shockwave of almost incredible violence. Ships might be crushed at ranges not equaled by explosions in air or by shallow-underwater explosions. Involving an entirely new kind of explosion, the test might fill a large gap in physicists' understanding of explosion phenomena. Would a great "gas bubble," hundreds of yards in diameter, break through the surface? Or would the surface remain unbroken? Would great waves be produced? Some cynics, believing that this type of test would produce the most damage, thought the Navy would try to avoid it.

To many persons it was clear that this test would be less important than the other two. On the technical side it was obvious that little or no thermal radiation would reach the surface. Neutron and gamma radiations also would be almost completely muffled by the intervening layer of water. The tactical considerations were even more pertinent. Nearly all harbors are shallow; most coastal waters are shallow. Thus a deep underwater explosion could never be used in these important regions. It would be applicable only in the open ocean, and here, of course, a fleet could be dispersed as widely as necessary so that only one or two ships could be sunk by one atomic bomb.

Nevertheless, plans were made to hold Test C, and a considerable amount of preparatory work was done. Studies were made as to how to position the target ships accurately. Anchoring being impractical in very deep water, thought was given to "streaming" the ships. They could be fastened to a small island by means of long cables, and then allowed to take up more or less fixed positions determined by the direction of the ocean currents and by the lengths of the cables. Or perhaps the ships could be powered and underway, steered by radio. Work was started also on methods of lowering the bomb to the desired depth, holding it in the desired position despite the ocean currents, and firing it. It was expected that the test would be held near Bikini Atoll, and construction crews went to work preparing necessary installations there.

But the success of the first two tests, together with the increasing shortage of military personnel and available civilian scientists, caused reconsideration of the desirability of holding this third test. And on September 7, 1946, President Truman, acting with the advice of the Joint Chiefs of Staff, postponed the test indefinitely. His statement was as follows:

> "In view of the successful completion of the first two atomic bomb tests of Operation Crossroads and the information derived therefrom, the Joint Chiefs of Staff have concluded that the third explosion, Test C, should not be conducted in the near future....
>
> "The additional information of value expected to result from Test C is such that the Joint Chiefs of Staff do not feel that completion of the test in the near future is justified."

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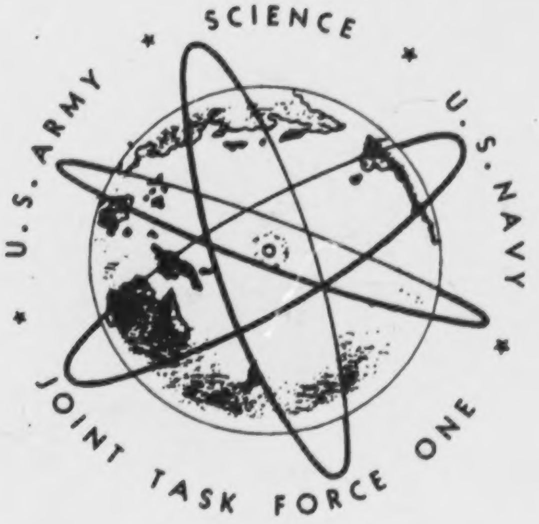
~~RESTRICTED~~

UNCLASSIFIED

REPORT ON
ATOMIC BOMB TESTS ABLE AND BAKER
(OPERATION CROSSROADS)


SCIENCE
U.S. ARMY
U.S. NAVY
JOINT TASK FORCE ONE

CONDUCTED AT
BIKINI ATOLL, MARSHALL ISLANDS
ON 1 JULY 1946 AND 25 JULY 1946

Commander, Joint Task Force One

UNCLASSIFIED

of submerged submarines, and operations to limit flooding of ships with severe underwater damage. Four target APA's on the southern fringe and one target APA on the western edge of the array received no appreciable radioactive contamination and were promptly reboarded and manned by their regular crews. Decontamination efforts were eventually sufficiently effective to permit the reboarding and manning of the destroyer CONYNGHAM on 4 August, and the reboarding and temporary manning of five target submarines in August and September. But all other major target vessels were so heavily contaminated that reboarding and detailed inspection could be undertaken only for a very short period each day, and manning them would have exposed their crews to unacceptable radioactive hazard. On 26 July the destroyer HUGHES and on 27 July the APA FALLON, were beached at Enyu Island to keep them from sinking. Of the six submarines submerged for test Baker; TUNA and DENTUDA were surfaced on 27 July and the latter was beached at Enyu on 28 July; SEARAVEN was surfaced on 29 July; the severely damaged SKIPJACK was finally surfaced on 2 September; and all attempts to surface the PILOTFISH and APOGON were unsuccessful. The PENNSYLVANIA, NEW YORK, PENSACOLA, and SALT LAKE CITY, had considerable flooding and operations were commenced early in August to pump them out and limit flooding. The capsized LCT-1114 was sunk by demolition charge on 30 July. ARDC-13 sank on 6 August as result of progressive flooding, which could not be checked because of extreme radioactivity. LCI-620, which was in damaged and generally poor material condition and of no further technical interest, was towed to sea and sunk by destroyer gun fire on 10 August. LST-125 in similar condition, was sunk by gun fire of the FALL RIVER on 14 August. Recovery of test animals was completed on 30 July. The general recovery of instruments and records was completed by 7 August.

3. As soon as the radiological situation permitted, the survey unit and construction unit commenced preparations for Test Charlie at the western end of the lagoon. The survey unit commenced hydrographic surveys, installed navigational aids, and conducted land surveys for Test Charlie instrumentation. The Construction Unit prepared moorings

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for Test Charlie targets, commenced construction for instrumentation towers, blasted out coral heads and prepared landings at the western islands.

4. After Test Baker, units were sailed from the forward area as soon as their services could be spared, and were released from the Task Force either immediately thereafter or on completion of unloading. The Drone Carrier Unit, Press and Observers Unit, ALBEMARLE, FURSE, BOUNTIFUL, and CUMBERLAND SOUND had sailed by 1 August. Additional departures by 10 August, included: Photographic Carrier Unit, Surface Patrol Group, Drone Boat Unit, BURLESON with all test animals, four PGM's; BAYFIELD, APPLING and two LST's with Army Equipment and personnel from Kwajalein and Eniwetok; OTTAWA and ST. CROIX with SeaBee equipment; the BOTTINEAU and the Army Air Group. Remaining after 10 August were: Target Group, Service Group, Seaplane Unit, part of Transport Unit, HAV[illegible] and WHARTON.

5. There was only one item of note with regard to [illegible] movements of ships after release from the Task Force. YP 6[illegible], after return to the Service Force Pacific Fleet, and while en route to San Francisco, ran aground at Miramontes Point, California, at 0415 on 13 September. No lives were lost, but the ship quickly broke up. Of her cargo, which comprised the entire collection of fish specimens painstakingly collected by the Oceanograph Survey Section, only 2% were salvageable.

6. There was an early demand for the presence of Vice Admiral Blandy in Washington in connection with evaluation of tests already conducted, discussions as to future tests, and decisions as to disposition of target vessels and radiological safety clearance of vessels released from the Task Force. By [illegible] August, activities had been reduced to detailed examinati[illegible] salvage of target ships, and survey and construction i[illegible]ration for Test Charlie, and on that date the Task Force Commander departed from Bikini in the MOUNT McKINLEY for Pearl Harbor. After conferring with CinCPac there, he hauled down his flag on 18 August and departed by air for Washington. At this time, Command of Joint Task Force ONE

activities in the Pacific was passed to Rear Admiral Fahrion, with title of Commander Naval Task Groups JTF-1, and Commander Advance Echelon JTF-1; in this capacity, Rear Admiral Fahrion reported to CinCPac for additional duty. Administration of the Task Force remained in the MOUNT McKINLEY until 26 August, when it was shifted to the headquarters in the Navy Department.

7. Early in August it became apparent that the tendency of radioactive material to concentrate and accumulate in the evaporators and marine growth on hulls of ships operating in Bikini Lagoon made it mandatory to shift the base of the Task Force to Kwajalein. At the same time, radiological surveys of target vessels indicated that many of these could not be boarded for sufficiently long periods to either prepare the ship for movement to Pearl Harbor or to assess fully in all cases the damage sustained, and it was recommended that the more heavily contaminated vessels be decommissioned at Kwajalein. CNO approved and CinCPac concurred with this plan, and ComNavTaskGrps was ordered on 16 August to shift base to Kwajalein and to proceed with the decommissioning of certain specified ships. This movement to Kwajalein was commenced late in August and completed early in September.

8. During the operations in Bikini Lagoon after Test Baker all ships were carefully monitored and were never allowed to operate in water of high radioactivity. However, evaporators and the marine growth on the hulls of ships were found to build up concentrations of radioactive material that exceeded tolerance limits. Prior to departure all ships were given a special monitoring and a conditional clearance was granted subject to the following of individually assigned procedures for safety. While the observance of a few simple safety precautions was in all cases sufficient to continue safe operation of these ships, it was recognized that these ships could not be released for unrestricted operation, repair or disposition until they were decontaminated and proved to be definitely clear of radioactivity. On 19 August a letter was addressed to ships which had been present at Bikini from 25 July to 10 August which directed the monitoring of such ships prior to dry docking or repair of contaminated machinery. By

28 August it became apparent that additional safeguards would be required, and recommendations were made to CNO and CinCPac that all exposed ships be assembled and put through a clearance procedure. This was approved by CNO, and CinCPac directed the assembly of exposed ships for necessary decontamination and monitoring. On 9 September a letter was addressed to the commanding officers of all exposed ships giving details of the clearance procedure, and a monitoring organization was set up by the Task Force under the direction of district medical officers. Rear Admiral Solberg of the Task Force staff was ordered to the West Coast for a conference with Commander Western Sea Frontier and to witness decontamination experiments at Hunters Point from 17 to 20 September. As result of this conference, experienced officers from the Task Force staff were ordered to temporary duty under Commander Western Sea Frontier to follow up and coordinate the decontamination, monitoring and clearance of exposed ships. On the basis of the experiments at Hunters Point, the Bureau of Ships and Bureau of Medicine and Surgery issued a joint speed letter on 24 September in which they assumed responsibility for giving final radiological clearance to vessels and prescribed-detailed decontamination and clearance procedures for ships destined for the active fleet. Additional directives from these two Bureaus covered further decontamination details and the decontamination and clearance procedures for ships destined for inactivation or disposal.

9. On 7 September 1946, the President announced that Test Charlie was indefinitely postponed. A directive was received from the Joint Chiefs of Staff relative to dissolving the Task Force. On 9 September the Task Force Commander directed that no further preparations be made for Test Charlie and that Operation CROSSROADS be terminated as soon as practicable consistent with obtaining vital information in regard to mechanical and radiological damage and retaining in usable condition ships which constitute valuable samples of such type of damage.

10. All survey and construction activities at Bikini were rapidly brought to a close, and the atoll was completely evacuated on 26 September 1946. For safety and security reasons, recommendation was made to CNO that Bikini lagoon

each day's work. Special change facilities and showers were set aside for this purpose on the target APA's which had been cleared. Special laundry facilities were also designated for washingthe contaminated clothing in order to avoid contaminating general laundries. Even with the most elaborate precautions it was necessary to exercise constant vigilance to insure that all personnel were safeguarded adequately. In spite of all handicaps, however, the work proceeded very satisfactorily.

18. On 9 August, the Director of Ship Material requested the Radiological Safety Officer and the Commander Target Group to visit ships on which ship's force were employing the detailed decontamination procedures. During that inspection, samples of materials were obtained from areas of the wardroom of PRINZ EUGEN for which geiger counter readings showed radiation intensities sufficiently low to permit extended personnel exposure without danger of injury. An analysis of the samples revealed the presence of alpha emitters which were not detectable with the monitoring instruments in use at Bikini. Further investigation showed probable widespread presence of the alpha emitter in the target area even in spaces not obviously contaminated. Since no alpha detectors for general field use were available and the alpha emitters are one of the most poisonous chemicals known, their presence was considered a serious and indeterminate menace to personnel exposed for indefinite periods of time on contaminated target vessels without special complex protective equipment and trained personnel to detect the alpha emitters. A conference was called by the Task Force Commander on 10 August to discuss the matter. As a result of this conference, continuation of detailed decontamination was considered unsafe under the existing conditions, and all further decontamination work on the targets by ship's force was ordered discontinued. Subsequently, all further work on these vessels by Task Force Personnel was limited to recovery of instruments, limited surveys, salvage work and preparations for towing from the area.

19. It was unfortunate in many respects that the decontamination procedures instituted had to be discontinued as a result of the investigation requested by the Director of Ship Material on 9 August. It is fortunate, of course, that the analysis of remaining products was made since the facts revealed thereby precluded the possibility of exposing large numbers of personnel to a hazard not detectable by instruments at hand. However, the planned procedures of pre-

Senator **Cranston**. The DNA rebuttal on page 89 of the GAO report states that "of the 42,000 participants at Operation Crossroads, only the approximately 9,000 persons who worked with the target fleet had any opportunity to receive a beta dose."

In contrast, page 229 of the DNA's 1984 historical report lists a total of 17,123 personnel as being in "frequent contact" with target ship decontamination and inspection after Test Baker, while an additional 1,016 personnel were listed as having "high potential for radiation exposure," though they were not involved in decontamination. This makes a total of 18,139 Crossroads personnel, if you can follow all of those figures, as compared to the 9,000 mentioned in your rebuttal.

How do you account for that difference?

Mr. **Boren**. May I answer, sir?

General **Pickitt**. Yes.

Mr. **Boren**. Sir, when the historical report was put out, we were under pressure from this committee to produce those reports quickly. We separated the Crossroads personnel into three general categories. Now, the 18,139 people are the crews of ships and units, from which certain amounts of people, limited numbers, went aboard the target vessels. Certainly not all 18,139 people abandoned the support ships and went aboard a target ship.

In May and April 1984, when we prepared our response to your inquiry of April 1984, we narrowed it down to no more than 9,000 people who went aboard target vessels. That was based on the reply that we gave to you, which we also provided to GAO with all of the supporting information.

Senator **Cranston**. Thank you.

I understand that there were two hospital ships at Crossroads to which individuals were sent who became sick, possibly from radiation. Is that correct?

Mr. **Boren**. Sir, there were three hospital ships. The *Haven* was converted completely for use by the radiation section. It did not attend to sick people. The *Bountiful* and the *Benevolence* were the other hospital ships, and they handled people who were ill.

Senator **Cranston**. Are there records from those two ships which contain information about who they treated and for what conditions?

Mr. **Boren**. No, sir, we have never recovered the medical logs for the *Bountiful* and *Benevolence*, and, of course, the *Haven* was not involved in medical treatments. If a man had a serious illness, it would be entered in his medical record because he would have to be excused from service, and it would have to be documented.

Senator **Cranston**. I have one last question.

Based upon all you know, General, at this stage, why do you believe the Operation Crossroads tests were terminated?

General **Pickitt**. I believe they were terminated in order to ensure the safe protection of the personnel involved.

Senator **Cranston**. The safety, did you say?

General **Pickitt**. The safety of the people involved, to be sure that the established standards to protect the test personnel were not exceeded.

Senator CRANSTON. The thrust of the testimony to this point really has been that there was no danger. So if that was the case, why would we not have proceeded to the third shot?

General PICKITT. I would describe it as follows, Senator.

The procedures that were established, and Dr. Warren and the team that he was working with, to ensure safety of the personnel, were monitoring the situation daily, hourly, as has been testified to today. As to the limits of the resources, such as experienced personnel, and the protective equipment needed to determine when established standards began to be approached, I believe that Dr. Warren and members of the group supervisory position recommended that they not continue with plans for further tests there.

And I believe that Dr. Warren made a statement that it was stopped in such time that he was not aware of major radiological threat to anyone, because operations were discontinued.

Senator CRANSTON. OK

Thank you all very much.

And let me say this finally, that there will be additional questions and statements to be submitted for the record in writing. The record will remain open for 2 weeks for additional statements and responses to questions.

I thank all of you for your presence at this hearing, and this hearing is now adjourned.

Thank you all very much.

General PICKITT. Thank you very much, sir.

[Whereupon, at 1:28 p.m., the committee was adjourned.]

[Additional material supplied for the record follows:]

Office of the
Administrator
of Veterans Affairs

Washington DC 20420

Veterans
Administration

FEB 12 1986

Honorable Frank H. Murkowski
Chairman, Committee on
Veterans' Affairs
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

Thank you for affording us this opportunity to provide the views of the Veterans Administration concerning the review of events at Operation CROSSROADS, two nuclear bomb detonations in the Pacific Bikini Island lagoon in 1946.

The GAO (General Accounting Office) recently completed a review of Operation CROSSROADS and offered a variety of recommendations concerning the development of estimates of radiation exposure experienced by the approximately 42,000 participants in that test series. Each of the recommendations was directed to the DNA (Defense Nuclear Agency).

At the outset, we must note that the DOD (Department of Defense), through its executive agent the DNA, has amply demonstrated its commitment and resolve to address the circumstances and events surrounding each of the 235 atmospheric nuclear tests that were conducted between 1945 and 1963 and involved approximately 200,000 participants. Since 1977, the DOD has been actively involved in a variety of efforts designed to provide the best available information concerning each of these shots. The Nuclear Test Personnel Review program has, among other things, provided the VA (Veterans Administration) with information regarding an individual's participation in the test program and the radiation dose of that individual.

In response to expressions of concern about possible underestimation of exposure, the DNA asked the National Academy of Sciences to review the procedures employed by the DNA in performing dose reconstruction, dose assignment and determination of internal dose. The Academy expects to issue its report in the near future. Further, the dose reconstruction methodology utilized by DNA was published for public scrutiny and comment with publication of a final rule establishing minimum standards for reporting nuclear radiation doses occurring in October 1985.

Several of the concerns raised by the GAO in its review of CROSSROADS have already been addressed by the DNA. For example, the reconstructed dose reporting by the military services for all test series will now include uncertainties analysis in addition to identification of the "most probable" dose. Also, because of concerns raised by GAO that external gamma radiation may have exceeded the maximum 2.0 rems that a handful of the CROSSROADS film badges registered, or that some servicemen would have had internal contamination through an open wound, DNA has agreed to perform individual dose reconstructions if such a claimant ever files for benefits.

Test participants should also be reassured by the DoD comments in response to the GAO's report. For example, the DNA has already arranged to have prepared a document for VA's use in analyzing the possible ranges of error in film badge readings. This will assist the VA in applying one of the factors our adjudication regulations require be considered in assessing the merits of a claim -- "any known limitations in the dosimetry devices employed." DNA has also performed a worst-case estimate of internal ingestion of radioactive particulate matter that could have occurred among the few CROSSROADS participants who may have eaten aboard target ships during decontamination procedures. This worst-case estimate (only 0.0014 rem to the bone over a fifty year period) will be included in the internal dose information supplied to the VA.

As the GAO has acknowledged, some of the uncertainties surrounding the Crossroads radiological environment may have led to overestimation as well as underestimation. DNA's dose-reconstruction methodologies include certain liberal assumptions that necessarily have resulted in overestimates in many cases. While it may never be possible to learn the exact dose, to several decimal points, that each individual CROSSROADS participant received, the GAO report does not suggest that radiation levels were appreciably different, in terms of health outcomes, from those already reported by DNA. DNA has calculated that the average exposure to the 42,000 CROSSROADS personnel was about 0.390 rem. As we indicated in our comments on the draft report, we cannot be certain whether any changes in radiation dose estimates which may result should DNA adopt GAO's recommendations would impact upon previously denied claims. Given the low dose estimates that are involved here, even an increase of two or threefold would likely be of little significance in the VA's adjudication of a claim dependent upon that estimate.

It should be noted that this group represents a significant percentage of all atomic test participants whose health status has not as yet been systematically studied. For this reason, the Chief Medical Director has been authorized to initiate, subject to the availability of adequate resources, the development of an approach for the conduct of a mortality study of CROSSROADS participants to complement the major study of other test participants completed last spring by the National Research Council's Medical Follow-up Agency. We will keep the Committee apprised of the results as they become available.

I appreciate this opportunity to provide these comments for the record.

Sincerely,

Everett Alvarez Jr.

EVERETT ALVAREZ, JR.
Acting Administrator

Medical Center
130 West Kingsbridge Road
Bronx, NY 10468

Veterans Administration

In Reply Refer To

December 16, 1985

The Honorable Frank H. Murkowski
Chairman
Committee on Veterans' Affairs
United States Senate
Washington, D. C. 20510

Dear Senator Murkowski:

Enclosed are my comments on the General Accounting Office Report of OPERATIONS CROSSROADS. From a physics point of view, the Report is a disaster. Please incorporate my comments where appropriate.

Sincerely yours,

Rosalyn S Yalow

Rosalyn S. Yalow, Ph.D.
Senior Medical Investigator, VA

cc; Senator Alan Cranston

COMMENTS BY DR. ROSALYN S. YALOW
ON GAO REPORT "OPERATIONS CROSSROADS"

The Report by the Comptroller General to the Congress on "Problems in Assessing the Cancer Risks of Low-Level Ionizing Radiation Exposure" on January 2, 1981 (Volume 2) listed GAO Consultants and Review Panel Members. This permitted the knowledgeable reader to assess the qualifications of those who prepared and reviewed the report. In the GAO Report to Sen. Cranston dated November 1985 on "Operation Crossroads" there is no listing of the consultants or review panel members so that it is not possible to evaluate the qualifications of the anonymous author(s) of this Report.

It is important to put the concern with the adequacy of film badge monitoring in the 1946 bomb tests into proper perspective by noting that, unlike the present time when radiation workers except for plane crews are generally monitored, radiology technicians including those serving in the Armed Services during, and for a number of years after, World War II were not issued film badges. When technicians in a radiology installation (Cleveland Clinic) more modern than those generally employed by the Armed Services during the War were monitored in 1953, their exposure was found to be 5-15 rem/year. If there were a total of 11 badges at Operation Crossroads with readings in excess of 1 rem and if 15% of the personnel were badged (p. 15 of GAO report) then there were probably less than 100 persons at Operation Crossroads who received more than 1 rem. This is to be compared with the 6500 World War II Army radiology technicians who undoubtedly had doses greatly in excess of 10 rem. These Army radiology technicians were shown 29 years later to have no increased incidence of malignancies compared to a control group of similar size consisting of Army medical, laboratory or pharmacy technicians (Radiology 96, 269, 1970). There is no reason to expect different biologic effects of radiation if exposure were to gamma rather than to X-radiation. Therefore personnel at Operation Crossroads who received less than 10 rem gamma-radiation should not have had adverse biologic effects.

Let us turn now to some considerations of omissions and a sampling of obvious errors in the GAO Report.

1. It should be appreciated that by one day after explosion of the early atom bombs the disintegration energy emission rate (both beta and gamma) is reduced by a factor of about 10^4 compared to that at 0.01 sec. In addition fission-product gamma-ray energies average about 0.7 Mev; beta particle energies average about 0.4 Mev and the average maximum beta particle energies are about 1.4 Mev (see attached). In view of the rapid fall-off of beta-radiation with time it is therefore to be expected, as was observed (see p. 42 of GAO report), that about 1/3 the badges during the six days after Test Baker (7/25-7/31/46) showed beta-radiation and that less than 1% of the badges exposed subsequently showed beta-radiation. The GAO report states (p. 42) "We found that the reason for this was beta radiation was generally not recorded". However they did not consider the fact that most of the beta exposure would have occurred very soon after the bomb and was unlikely to be significant after the first six days.

2. The dosimetry expert in the environmental sciences

department of the Reynolds Electrical and Engineering Department who is quoted failed to inform those preparing the GAO report of the scientific reason for the use of a lead filter on a portion of the film badge (p. 43 GAO). The effects of gamma rays are not due to their direct or primary ionization. At energies of less than 1 Mev the absorption of gamma-rays in lead is due primarily to photoelectric and Compton effects. The secondary electrons produced in these processes are responsible for the ionization attributable to the gamma-rays. Thus the open area of the film would measure primarily beta-radiation. The average 0.7 Mev gamma-ray would not be well-absorbed even by the silver in film and therefore would have little effect on the film directly. However the lead filter would absorb the incident beta-particles and darkening under the filter would be due to the secondary electrons resulting from absorption of the gamma-rays. Since the GAO Report does not state the thickness of the filter, I cannot determine whether it was optimal for enhancing secondary electron production. The secondary electrons associated with absorption of 0.7 Mev gamma-rays by the photoelectric effect would have an energy of about 0.6 Mev. Their maximum range would be about 0.3cm in tissue or about 0.03cm lead. If the lead filter had this thickness, the darkening of the film under this filter would have been maximally enhanced for incident 0.7 Mev gamma-rays.

The GAO report states (p. 41) "According to a DNA-recognized expert in film badge dosimetry, for the type of film badge used at Operation Crossroads, gamma radiation would have blackened the film area outside the lead cross as much as the film area under the cross". This so-called expert, if quoted correctly, would appear to be ignorant of the enhancing effect of an appropriate lead filter for high energy gamma-radiation. Thus it would indeed be unfortunate if both the GAO and the DNA were to consider him expert in this area. In fact if the filter were of appropriate thickness the film badge darkening shown in Fig 2.5 is exactly what one would expect in the absence of beta-radiation but in the presence of gamma-radiation with energies in excess of a few tenths of an Mev.

3. The GAO report states that beta-radiation may penetrate to a depth of 1/2 inch (1.2cm) in tissue (p 42 and 115). This penetration would represent the maximum penetration of 2.4 Mev beta-particles. The report did not state which beta-emitter among the fission fragments had this maximum energy. According to a well-known physics textbook (see attached) the average fission product beta-particle energy was about 0.4 Mev which corresponds to a maximum penetration of less than 0.2 cm, certainly not enough to penetrate clothing and the superficial layers of the skin.

It should be noted that the National Academy of Sciences BEIR III report states (p. 327) that radiation-induced cancer of the prostate and testis have not been observed, so that even if the participants were unclothed, which they were not, beta doses to the gonads would have been irrelevant. The known radiation effect on the eyes are radiation cataracts. There is general agreement that this requires acute X or gamma radiation exposures in excess of 200 rads (BEIR III p. 600). Thus there is no reason for concern of minimal exposure of eyes to beta-radiation. There have been no reports of radiation-induced skin cancer following acute beta-radiation.

4. The question of internal contamination with radionuclides must also be addressed. Of major concern would have been contamination with alpha-emitting plutonium (Pu). However Pu radionuclides of concern have long physical and biologic half-lives (NCRP Report No. 65 p. 89). Had there been sufficient internal Pu contamination to produce significant biologic effects it would now be possible to determine the extent of the previous contamination simply from current urinary Pu levels. Such determinations are performed at present at Brookhaven National Laboratory. There is no need to make assumptions concerning alpha, beta, and gamma radiation ratios. Direct determination of the body burden of plutonium should suffice.

There is no doubt that film badge readings depends upon knowledge of the quality of radiation. It is therefore not impossible that errors as large as 100% or even higher may easily occur. However it should be appreciated that among the 80,000 survivors of the Hiroshima-Nagasaki bombings who received in excess of 10 rems there were only an estimated 250 radiation-related cancer deaths among the 4500 cancer deaths expected in that population by 1978 if they had no radiation exposure (Radiat. Res. 90,395, 1982). Furthermore there were fewer cancer deaths than expected in those who had exposures in the 0-9 rem range. It does not seem reasonable therefore to be concerned with whether the exposures of the 11 badges which were read as being in the 1-2 rem range were really 100% higher. There is nothing in the GAO Report that suggests that gamma-radiation exposure of the participants in Operation Crossroads could have been in excess of 10 rems. Since there are no radiation related cancers reported to be associated with external beta radiation and since the question as to whether there was internal contamination with plutonium can be determined directly now from measurements on urine, it is only the gamma-exposure which is relevant.

This GAO Report appears to have little scientific merit. Perhaps this is why there is no listing of knowledgeable consultants who assisted in its preparation.

NUCLEAR RADIATION PHYSICS

Ralph E. Lapp
Secretary
Quadri-Science, Inc.

Howard L. Andrews
Chief, Department of Radiation Safety
National Institutes of Health

PRENTICE-HALL, INC.
Englewood Cliffs, N. J.

THIRD EDITION

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Figures 13-15 and 13-16 show the variations of energy release and decay rate as functions of time. As a rough rule, beta emission accounts for about ⅔ of the decay energy; gamma rays, about ⅓. Average fission-product gamma-ray energies are 0.7 Mev; average beta-particle energies are 0.4 Mev; average values of maximum beta energies, 1.4 Mev.

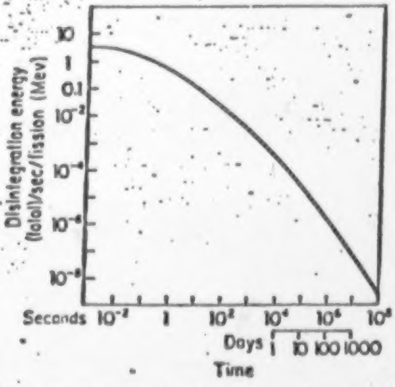

Fig. 13-15. Rate of energy release per fission as a function of time. (From K. Way and E. P. Wigner, *Phys. Rev.*, **75**, 1318, 1948.)

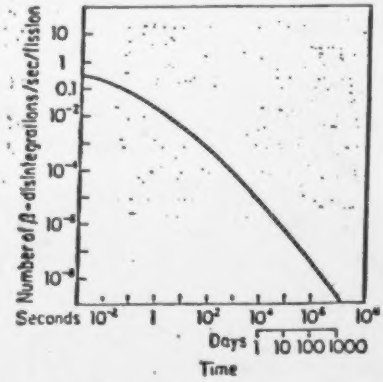

Fig. 13-16. Beta activity as a function of time after fission. (From K. Way and E. P. Wigner, *Phys. Rev.*, **75**, 1318, 1948.)

FRANK H. MURKOWSKI, ALASKA, CHAIRMAN

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JONATHAN R. STEINBERG, MINORITY CHIEF COUNSEL/
STAFF DIRECTOR

United States Senate

COMMITTEE ON VETERANS' AFFAIRS
WASHINGTON, DC 20510

January 8, 1986

Lt. Gen. John L. Pickitt
Defense Nuclear Agency
Hybla Valley Federal Building
6801 Telegraph Road
Alexandria, Virginia 22310-3398

Dear Gen. Pickitt:

I am writing to request that the Defense Nuclear Agency (DNA) respond in writing for the December 11 hearing record to the comments made by Dr. Rosalyn S. Yalow regarding the General Accounting Office report entitled "Operation Crossroads: Personnel Radiation Exposure Estimates Should Be Improved".

As Chairman of the Senate Veterans' Affairs Committee, I am most interested in learning the views of DNA regarding Dr. Yalow's views of the report. I would appreciate receiving your comments as soon as possible.

Sincerely,

Frank H. Murkowski

Frank H. Murkowski
Chairman

Defense Nuclear Agency
Washington, D.C. 20305-1000

24 January 1986

Honorable Frank H. Murkowski
Chairman
Committee on Veterans' Affairs
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

This is in response to your letter of January 8, 1986 concerning Dr. Rosalyn S. Yalow's comments on the General Accounting Office's (GAO) report on CROSSROADS.

We are pleased that a distinguished scientist such as Dr. Yalow has taken the time to evaluate this issue. Dr. Yalow, of course, is a Nobel laureate for her work in physiology and medicine. She is one of the foremost experts in the world on the medical use of radioisotopes, radioimmunoassay, and radiation chemistry. Her insight and analysis on this report is most welcome.

DNA agrees with Dr. Yalow's first point that beta radiation aboard the target ships would drop below significant levels about six days after the BAKER detonation, the same day that the target ships were reboarded by crews for decontamination. No document has explained why the CROSSROADS film badge processors generally stopped recording beta exposures on this date, but Dr. Yalow's analysis is a logical one.

Dr. Yalow's second point concerns film badges. Her arguments are consistent with the affidavit provided by Dr. Gerhard Dessauer, the Chief of Photometry (film badges) at CROSSROADS. Dr. Dessauer's affidavit was provided as an attachment to DNA testimony at the hearing on December 11, 1985. For the record, film badges at CROSSROADS had a lead filter of 0.02cm thickness. As explained to GAO, this filter was thinner than the filter used at most of the other nuclear tests. This resulted in a slight overresponse from low energy gamma, with perhaps a 10% overestimation of the true gamma exposure.

Dr. Yalow's third point deals with physical properties and biological effects of external beta radiation. DNA also concurs with her analysis which is similar to the logic the Defense Nuclear Agency (DNA) developed for GAO on this subject. There is no logical reason for DNA to finance beta dose reconstructions when there is no known somatic effect from beta radiation.

Honorable Frank H. Murkowski

Dr. Yalow's fourth point deals with the possibility of using bioassay methods to determine the current body burdens in exposed veterans. In our letter of December 30, 1985, we gave you our views on this interesting and potentially valuable technique.

Many of Dr. Yalow's comments deal with the fact that low-level radiation exposures are unlikely to cause any biological effect. This is true, but it is not the role of the Defense Nuclear Agency to assess the biological effects of these exposures. This agency's role is to determine the radiation exposures as accurately as possible. By law, the Veterans Administration is responsible for ascertaining if these exposures have sufficient probability of causing radiogenic illness of a veteran.

However, DNA regards Dr. Yalow's analysis as well reasoned, accurate, and pertinent to this issue. We appreciate the opportunity to review and comment on her report.

Sincerely,

John L Pickitt

JOHN L. PICKITT
Lieutenant General, USAF
Director

[illegible]

RUDY BOSCHWITZ, MINNESOTA

ANTHONY J. PRINCIPI, CHIEF COUNSEL/STAFF DIRECTOR
JONATHAN R. STEINBERG, MINORITY CHIEF COUNSEL/
STAFF DIRECTOR

United States Senate

COMMITTEE ON VETERANS' AFFAIRS
WASHINGTON, DC 20510

January 8, 1986

Hon. Charles A. Bowsher
Comptroller General of the United States
General Accounting Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Mr. Bowsher:

I am writing to request that the General Accounting Office (GAO) respond in writing for the December 11 hearing record to the comments made by Dr. Rosalyn S. Yalow regarding the GAO report entitled "Operation Crossroads: Personnel Radiation Exposure Estimates Should Be Improved".

As Chairman of the Senate Veterans' Affairs Committee, I am most interested in learning the views of GAO regarding Dr. Yalow's views of the report. I would appreciate receiving your comments as soon as possible.

Sincerely,

Frank H. Murkowski

Frank H. Murkowski
Chairman

Enclosure

FRANK H. MURKOWSKI, ALASKA, CHAIRMAN
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STAFF DIRECTOR

United States Senate

COMMITTEE ON VETERANS' AFFAIRS
WASHINGTON, DC 20510

December 27, 1985

Honorable Charles A. Bowsher
Comptroller General of the
United States
General Accounting Office
Washington, D.C. 20548

Dear Charles

Enclosed is a copy of a December 16 letter from Dr. Rosalyn Yalow, a Veterans' Administration Senior Medical Investigator and Nobel laureate, to Committee Chairman Murkowski, with which she enclosed her comments on your November 8, 1985, report to me, entitled "Operation Crossroads" (B-219252).

Dr. Yalow's comments include a number of general and specific criticisms of the report. I would very much appreciate your providing me at your earliest opportunity with a point-by-point response to each criticism that she has expressed.

As always, I am grateful for your cooperation and assistance.

With warm regards,

Cordially,

Alan

Alan Cranston
Ranking Minority Member

Enclosure

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

RESOURCES, COMMUNITY,
AND ECONOMIC DEVELOPMENT
DIVISION

MAR 11 1986

The Honorable Frank H. Murkowski
Chairman, Committee on
Veterans' Affairs
United States Senate

Dear Mr. Chairman:

This is in reply to your January 8, 1986, request that we provide a point-by-point response to the criticisms of our report entitled Operation Crossroads: Personnel Radiation Exposure Estimates Should Be Improved (RCED-86-15, Nov. 8, 1985) contained in a letter dated December 16, 1985, from Dr. Rosalyn S. Yalow, Senior Medical Investigator, Veterans Administration. In that letter, which has been included as enclosure I, Dr. Yalow raises a number of concerns about our report from a physics point of view. Some overall comments regarding Dr. Yalow's letter follow, with our detailed responses to her specific concerns included as enclosure II.

First, Dr. Yalow expresses concern because the report does not list the consultants upon whom we relied in formulating the views contained in the report, as did our January 2, 1981, report entitled Problems in Assessing the Cancer Risks of Low-level Ionizing Radiation Exposure (EMD-81-1). Dr. Yalow feels it is therefore impossible to evaluate the qualifications of the authors of the report.

It is important to understand that the scope and purpose of the two reviews differed considerably. It was our intent, in performing our 1981 review of the cancer risks of low-level ionizing radiation exposure, to break new ground on this issue. Thus, we elicited the assistance of outside technical consultants in many different areas who assisted us in formulating the scope of the review and who prepared many of the technical sections appearing in the final report. Because of their extensive contribution to the report, we considered it appropriate that the names of these individuals be included as an appendix.

Conversely, in performing our 1985 review of Operation Crossroads, we were essentially asked to examine a collection of documents once belonging to the late radiological safety officer for that operation and determine whether information appearing in those documents had been fully considered by the Defense Nuclear Agency in calculating radiation exposure estimates for Operation Crossroads personnel. This examination of original Crossroads-related material was undertaken and the report drafted by GAO evaluator staff experienced in working on nuclear issues and did not require the extensive detailed assistance of technical consultants. Nonetheless, where technical assistance was necessary in interpreting or understanding technical information, outside experts or specialists were contacted and their views considered. Enclosure III of this letter lists of the experts or consultants contacted during our review.

In addition, we sent copies of our draft report both to the Veterans Administration and to the Department of Defense for comment. In speaking with our liaison contact at the Veterans Administration, it is our understanding that copies of our draft report were distributed to such offices within that agency as the Division of Medicine and Surgery, Division of Veterans' Benefits, and Office of General Counsel. Opinions from those offices formed the basis for the comments from the Veterans Administration contained in its letter to us dated August 26, 1985. According to our liaison contact at the Veterans Administration, the comments in its August 26, 1985, letter represent the official views of that agency on our Operation Crossroads report, while those expressed by Dr. Yalow are her own professional views.

The second overall comment we would like to offer regarding Dr. Yalow's letter concerns her view that our Operation Crossroads report has little scientific merit. Dr. Yalow bases this view on her professional judgment that, even if radiation exposure estimates were adjusted in accordance with our report's recommendations, the adjusted radiation exposure dose estimates would not be significant for Crossroads personnel and would probably not have produced adverse health effects. The purpose of our review was not to reach scientifically valid conclusions regarding the likely health effects to be expected among the Operation Crossroads population. Rather, our work was limited to critiquing how well the Defense Nuclear Agency had developed and supported its radiation dose estimates. Having found that certain factors were not considered in estimating those radiation doses, we recommended that appropriate actions be taken to adjust the estimates. As to whether such actions have merit, we would like to point out that the Veterans Administration, in its official comments on our report, stated that it appears that our recommended actions for adjusting radiation exposure estimates should not only be applied to participants of Operation Crossroads but also to participants in all other atmospheric nuclear tests.

In summary, we are confident that our Operation Crossroads report is technically correct and directly responds to the questions we were asked to address regarding the accuracy of radiation exposure estimates for Operation Crossroads personnel. We recognize that there may be a range of views among equally well-informed individuals as to whether adjusting radiation exposure estimates as we recommended would show that Crossroads personnel were exposed to potentially harmful doses of radiation during that operation. It was our intent, in preparing the final report, that if the Defense Nuclear Agency implemented our recommendations, that question would be better answered.

If necessary, please contact us for any additional information.

Sincerely,

J. Dexter Peach

J. Dexter Peach
Director

Enclosures - 3

COMMENTS BY DR. ROSALYN S. YALOW AND GAO RESPONSES ON GAO REPORT "OPERATION CROSSROADS"

Comment 1

The Report by the Comptroller General to the Congress on "Problems in Assessing the Cancer Risks of Low-Level Ionizing Radiation Exposure" on January 2, 1981 (Volume 2) listed GAO Consultants and Review Panel Members. This permitted the knowledgeable reader to assess the qualifications of those who prepared and reviewed the report. In the GAO Report to Senator Cranston dated November 1985 on "Operation Crossroads" there is no listing of the consultants or review panel members so that it is not possible to evaluate the qualifications of the anonymous author(s) of this Report.

Response

It was our intent, in performing our 1981 review of the cancer risks of low-level ionizing radiation exposure, to break new ground on this issue. Thus, we elicited the assistance of outside technical consultants in many different areas who assisted us in formulating the scope of the review and who prepared many of the technical sections appearing in the final report. Because of their extensive input to the report, we considered it appropriate that the names of these individuals be included as an appendix to that report. Conversely, in performing our 1985 review of Operation Crossroads, we were asked to examine a collection of documents once belonging to the late radiological safety officer for that operation and determine whether information appearing in those documents had been fully considered by the Defense Nuclear Agency (DNA) in calculating radiation exposure estimates for Operation Crossroads personnel. This examination of original Crossroads-related material did not require the extensive input or assistance of technical consultants. Nonetheless, where such assistance was necessary in interpreting technical information, outside experts or specialists were contacted.

The reason for not listing these experts or specialists in our final Operation Crossroads report is because GAO's policy instead requires us to include, in the objectives, scope, and methodology section of the first chapter of our reports, a brief discussion of how we conducted our work and made use of experts, such as in regard to film badge dosimetry (see page 17 of our Operation Crossroads report).

In addition to the experts mentioned on that page, nearly 20 other experts or specialists were contacted to assure the technical accuracy of the information discussed in the report. For example, in the area of film badge dosimetry, we contacted and relied heavily upon the advice of both Dr. Margarite Uhrlich, U.S. National Bureau of Standards, and Dr. Allan Brodskv, U.S. Nuclear Regulatory Commission. Both individuals have written many publications on film badge dosimetry, and Dr. Brodsky's publication entitled Handbook of Radiation Measurement and Protection is included in the bibliography to the DNA's report entitled Reference Manual, which was prepared by that agency to provide the reader with an understanding of technical terms and concepts used in the agency's reports on the atmospheric nuclear weapons testing program. In addition, we asked Dr. Uhrlich to review our report section on film badge dosimetry, and she concurred in its findings.

Comment 2

It is important to put the concern with the adequacy of film badge monitoring in the 1946 bomb tests into proper perspective by noting that, unlike the present time when radiation workers except for plane crews are generally monitored, radiology technicians including those serving in the Armed Services during, and for a number of years after, World War II were not issued film badges. When technicians in a radiology installation (Cleveland Clinic) more modern than those generally employed by the Armed Services during the War were monitored in 1953, their exposure was found to be 5-15 rem/year. If there were a total of 11 badges at Operation Crossroads with readings in excess of 1 rem and if 15 percent of the personnel were badged (p. 15 of GAO report) then there were probably less than 100 persons at Operation Crossroads who received more than 1 rem.

Response

It is not necessarily correct to assume that if only 11 Crossroads film badges measured 1 or more rem of gamma radiation and if film badges were issued to 15 percent of the Crossroads personnel, then probably fewer than 100 persons at Operation Crossroads received 1 or more rem. There is a certain inaccuracy associated with film in film badges and with film badge processing. Because of this inaccuracy, certain Crossroads film badges, and the wearers of those badges, could have been exposed to 1 or more rem of gamma radiation even though the film badges measured less than 1 rem. In addition, Crossroads film badges were issued and processed on a daily basis. While 15 percent of the Crossroads personnel received film badges, many within this 15 percent total received a number of daily badges to wear during the operation. An individual given four daily film badges to wear that read .4 rem, .3 rem, 0 rem, and .3 rem, for example, could collectively have been exposed to 1 rem of gamma radiation.

Furthermore, in our view, it may not be correct to extrapolate from the exposure readings for 15 percent of Crossroads personnel who wore a film badge one or more times during the operation to the 85 percent who wore no film badge at all. Crossroads film badges were supposed to be issued to those individuals with potential for radiation exposure but there is some question as to whether that occurred. For instance, as the Department of Defense noted in its comments on our report (see app. IV, page 77), one film badge with an apparent 2.0 rem exposure had been issued at random to a stewards mate with no record of entering a radioactive environment. For that reason, the Department of Defense indicated that if this individual filed a Veterans Administration claim, the Department would perform a dose reconstruction, using information supplied by the veteran, to provide the best possible assessment of his true exposure. Thus, for all the above reasons, there is considerable doubt about the appropriateness of Dr. Yalow's extrapolation that there were probably less than 100 persons at Operation Crossroads who received more than 1 rem of radiation.

Comment 3

This is to be compared with the 6500 World War II Army radiology technicians who undoubtedly had doses greatly in excess of 10 rem. These Army radiology technicians were shown 29 years later to have no increased incidence of malignancies compared to a control group of similar size consisting of Army medical, laboratory or pharmacy technicians (Radiology 96, 269, 1970).

Response

Dr. Yalow's analysis of the 6500 Army radiology technicians is based on an article entitled "A Search for Late Radiation Effects Among Men Who Served as X-Ray Technologists In The U.S. Army During World War II", which appeared in the August 1970 issue of the scientific publication Radiology. For two specific reasons, use of information from that article may not lead to meaningful conclusions regarding the likely biological effects experienced by personnel who participated in Operation Crossroads. First, the article does not state that the technicians received doses of 10 rems, but instead states that the radiation doses received by the technicians could not be established with any precision. Therefore, any contrast with the radiation doses received by the Operation Crossroads personnel must, by necessity, be a somewhat qualitative rather than quantitative comparison. Second, any evidence or lack of evidence of excess incidence of cancer among the 6500 Army radiology technicians may not be statistically significant in view of the size of this small population. In this regard, Dr. Yalow indicated herself--in an article written for the Winter 1984 issue of the publication The Pharos--that without examining subjects numbering in the millions, statistically valid results cannot be obtained in the dose range of up to tens of rems of radiation.

Comment 4

There is no reason to expect different biologic effects of radiation if exposure were to gamma rather than to X-radiation. Therefore personnel at Operation Crossroads who received less than 10 rem gamma-radiation should not have had adverse biologic effects.

Response

In essence, Dr. Yalow indicates that 10 rem of radiation from X-radiation (as from x-ray treatment) or from gamma radiation, would produce no harmful effects. However, the debate regarding the cancer risks of low-level radiation is a continuing one for which there is no current scientific consensus. In opposition to Dr. Yalow's judgment, DNA's Reference Manual states that many experts do not believe there is a threshold radiation dose for most of the long-term biological effects. In other words, any radiation received may shorten life span and possibly have carcinogenic effects, which suggests that the more radiation received, the more adverse the effect. In addition, the current permissible exposure dose for gamma radiation for radiation workers in the United States is 5 rem per year. Further, the Veterans Administration has awarded radiation-related compensation to at least one veteran whose total calculated dose for gamma radiation was less than 1 rem. In view of these divergent positions on the biological effects of low-level ionizing radiation, we considered it best to limit our review, as requested, to the accuracy of radiation exposure estimates for Crossroads personnel and leave the debate regarding the cancer risks of low-level ionizing radiation to those more knowledgeable about the issue.

Comment 5

Let us turn now to some considerations of omissions and a sampling of obvious errors in the GAO Report.

1. It should be appreciated that by 1 day after explosion of the early atom bombs the disintegration energy emission rate (both beta and gamma) is reduced by a factor of about 10^4 compared to that at 0.01 sec. In addition fission-product gamma-ray energies average about 0.7 Mev; beta particle energies average about 0.4 Mev and the average maximum beta particles energies are about 1.4 Mev (see attached). In view of

the rapid fall-off of beta-radiation with time it is therefore to be expected, as was observed (see p. 42 of GAO report), that about 1/3 of the badges during the 6 days after Test Baker (7/25 - 7/31/46) showed beta radiation and that less than 1 percent of the badges exposed subsequently showed beta-radiation. The GAO report states (p. 42) "We found that the reason for this was beta radiation was generally not recorded". However they did not consider the fact that most of the beta exposure would have occurred very soon after the bomb and was unlikely to be significant after the first 6 days.

Response

Regarding external beta radiation, we observed that DNA has assigned this type of exposure estimate to only those Crossroads personnel who wore film badges based on readings from the badges. However, because film badges were worn by only about 15 percent of the Crossroads personnel, certain other participants of that operation may also have been exposed to external beta radiation but received no dose estimate. Further, for those who wore film badges, we found many may have received an external beta radiation exposure but were given a zero recorded dose. For instance, we determined that beginning in August 1946--6 days after the second of the two Crossroads detonations--persons processing film badges and recording the results in film badge ledgers determined that external beta radiation exposure existed on almost all of the 1300 film badges recorded in a particular film badge ledger but then did not convert, for some unknown explanation, this exposure into an external beta radiation dose. Thus, a zero recorded external beta radiation dose was later assumed for those individuals wearing these badges. DNA officials, in providing comments on our draft report, attributed this oversight to clerical error. Therefore, we recommended that the Secretary of Defense direct DNA to reassess the accuracy of the external beta radiation dose information for those who wore film badges and because, as stated, not all wore film badges, perform a dose reconstruction for external beta radiation.

In formulating this recommendation, we recognized that external beta radiation would have been greater immediately after both Crossroads detonations than later in the operation. However, during the month of August 1946, when dosimetry personnel, as stated, stopped converting the external beta radiation exposure detected on the film badges into exposure doses, high levels of external beta radiation were also being reported. For instance, in an August 7, 1946, memorandum to the commander of the Crossroads joint task force, the radiological safety officer stated

> "contamination of hands and faces with beta emitters of intensities greater than tolerance (0.5 rem/day) is exceedingly common. It is not infrequent to find personnel with amounts on the bare hand bordering on erythema [reddening of the skin] dose levels (if not removed within 24 hours)."

Thus, we believe that our finding of clerical error in recording external beta radiation exposure and our recommendation to correct this error continue to have merit.

Comment 6

2. The dosimetry expert in the environmental sciences department of the Reynolds Electrical and Engineering Department who is quoted failed to inform those preparing the GAO report of the scientific reason for the use of a lead filter on a portion of the film badge (p. 43 GAO). The effects of gamma rays are not due to their direct or primary ionization. At energies of less than 1 Mev the absorption of gamma-rays in lead is due primarily to photoelectric and Compton effects. The secondary electrons produced in these processes are responsible for the ionization attributable to the gamma-rays. Thus the open area of the film would measure primarily beta-radiation. The average 0.7 Mev gamma-ray would not be well-absorbed even by the silver in film and therefore would have little effect on the film directly. However, the lead filter would absorb the incident beta-particles and darkening under the filter would be due to the secondary electrons resulting from absorption of the gamma-rays. Since the GAO Report does not state the thickness of the filter, I cannot determine whether it was optimal for enhancing secondary electron production. The secondary electrons associated with absorption of 0.7 Mev gamma-rays by the photoelectric effect would have an energy of about 0.6 Mev. Their maximum range would be about 0.3 cm in tissue or about 0.03 cm lead. If the lead filter had this thickness, the darkening of the film under this filter would have been maximally enhanced for incident 0.7 Mev gamma-rays.

Response

Dr. Yalow stated, given the average energy level of radiation present following a nuclear detonation, that if the filter on the film badge were the appropriate thickness, there would have been accurate darkening of the film. However, there were a wide range of energy levels at Operation Crossroads and, according to a January 9, 1985 letter from Mr. Jay Brady, the Department of Defense's expert consultant on film badge dosimetry--who has worked with such devices at the Nevada test site for more than 30 years--to DNA's assistant nuclear test personnel review program manager, the lead filter on the Crossroads film badge was not the appropriate thickness to maintain uniform film badge response over a wide range of energy levels. This, according to Mr. Brady's letter, was recognized after Operation Crossroads and was corrected so that film badges used in later atmospheric nuclear weapons testing program operations were fitted with a lead cross of appropriate thickness.

Comment 7

The GAO report states (p. 41) "According to a DNA-recognized expert in film badge dosimetry, for the type of film badge used at Operation Crossroads, gamma radiation would have blackened the film area outside the lead cross as much as the film under the cross". This so-called expert, if quoted correctly, would appear to be ignorant of the enhancing effect of an appropriate lead filter for high energy gamma-radiation. Thus it would indeed be unfortunate if both the GAO and the DNA were to consider him expert in this area. In fact if the filter were of appropriate thickness the film badge darkening shown in Fig. 2.5 is exactly what one would expect in the absence of beta-radiation but in the presence of gamma-radiation with energies in excess of a few tenths of a Mev.

Response

We agree with Dr. Yalow regarding the effects on the film badge if the filter were the appropriate thickness and if there was an absence of beta radiation but the presence of gamma radiation in excess of a few tenths of a Mev. However, as indicated in the preceding response, the film badge used at Operation Crossroads was not fitted with a lead cross of appropriate thickness. Thus the film under the lead cross would not have correctly recorded exposure to gamma radiation. In the corner areas not covered by the lead cross, according to a March 18, 1983, letter by Mr. Brady to the Navy nuclear test personnel review program manager, the type of film used at Crossroads would have been sensitive to beta radiation and to both low- and high-energy gamma radiation. The result would be blackening of the film, as pictured in figure 2.4 on page 43 of our Operation Crossroads report, such that the corner areas would be darker than the areas of the film under the lead cross. Mr. Brady, in his March 18, 1983, letter, cited information contained in the 1958 book entitled Radiation Dosimetry as support for this position.

Comment 8

3. The GAO report states that beta-radiation may penetrate to a depth of 1/2 inch (1.2 cm) in tissue (p. 42 and 115). This penetration would represent the maximum penetration of 2.4 Mev beta-particles. The report did not state which beta-emitter among the fission fragments had this maximum energy. According to a well-known physics textbook (see attached) the average fission product beta-particle energy was about 0.4 Mev which corresponds to a maximum penetration of less than 0.2 cm, certainly not enough to penetrate clothing and the superficial layers of the skin.

Response

We agree with Dr. Yalow about the relative penetrating ability of average beta-particle energy. However, neither we nor the Department of Defense know what beta radiation energy levels existed at Operation Crossroads. Our report states that external beta radiation may penetrate up to a depth of about 1.2 centimeters. This was done to provide the reader with some perspective on the penetrating power of external beta radiation relative to other radiation types and is based on two documents. According to DNA's report entitled Reference Manual, in dense material--such as body tissue--high-energy beta particles may travel up to a centimeter. In addition, according to the International Atomic Energy Agency's handbook entitled Radiation--A Fact of Life, beta radiation can pass through 1 to 2 centimeters of human flesh.

Comment 9

It should be noted that the National Academy of Sciences BEIR III report states (p. 327) that radiation-induced cancer of the prostate and testis have not been observed, so that even if the participants were unclothed, which they were not, beta doses to the gonads would have been irrelevant.

Response

We do not dispute the absence of evidence regarding cancer induction to the gonads from radiation. However, according to the 1982 report on the Effects of Atomic Radiation by the United Nations Scientific Committee, radiation of the gonads does cause sterility and with larger doses sterility may become permanent. In addition, this 1982 report states that the gonads do not respond to radiation damage like other normal tissues in that the gonads do not repair themselves from sublethal cell radiation damage. This suggests that any effects to the gonads from radiation exposure may be long-lasting.

Further, it is possible that Crossroads participants--contrary to Dr. Yalow's statement--were not fully clothed at all times during that operation. According to testimony by Dr. Karl Z. Morgan--a former Crossroads participant--before the House Committee on Veterans' Affairs during 1983 hearings, because temperatures were over 100 degrees fahrenheit at night, men were sleeping topside in the nude.

Comment 10

The known radiation effect on the eyes are radiation cataracts. There is general agreement that this requires acute X or gamma radiation exposures in excess of 200 rads (BEIR III p. 600). Thus there is no reason for concern of minimal exposure of eyes to beta-radiation.

Response

The single threshold radiation dose for causing cataracts to the eye is an area which, apparently, is not completely known and which is undergoing continuing reevaluation and review. For instance, the 1980 report by the Committee on the Biological Effects of Ionizing Radiation--mentioned by Dr. Yalow--suggests that a single threshold radiation dose of 200 rads is necessary for causing cataracts. However, a 1982 article appearing in the publication Radiation Research suggests, based on radiation dose estimates of survivors of the Hiroshima-Nagasaki bombings, that a single threshold radiation dose of 110 rads, or about half that mentioned in the previously cited 1980 report, would be sufficient for causing cataracts. Another article entitled "Delayed Biomedical Effects of the Bombs" appearing in the August 1985 issue of the Bulletin of the Atomic Scientists, states that serious challenges--beginning in 1981--have been raised about the accuracy of many of the factors used to assign radiation dose estimates to those individuals who survived the Hiroshima-Nagasaki bombings. The article indicates that a binational reevaluation of radiation exposures is now in progress and is expected to last another year. However, it is already clear that previous dose estimates will, in most cases, be reduced, but the extent of the reduction will vary from individual to individual. The article concludes by saying that, except for leukemia, the understanding of the carcinogenic effects of exposure to the Hiroshima-Nagasaki bombs is still quite incomplete.

Comment 11

There have been no reports of radiation-induced skin cancer following acute beta-radiation.

Response

According to two experts in the area of medical effects from nuclear radiation--Dr. David Kocher with the Health and Safety Research Division of Oak Ridge National Laboratory and Dr. Robert Conard, former head of the Marshall Island Medical Program at the Brookhaven National Laboratory--external beta radiation may cause skin cancer. Dr. Kocher elaborated on that comment by saying that experimental evidence as to the possible effects of external beta radiation has not been established one way or the other. Therefore, as a conservative assumption, it is assumed that external beta radiation may produce carcinogenic effects.

Comment 12

4. The question of internal contamination with radionuclides must also be addressed. Of major concern would have been contamination with alpha-emitting plutonium (Pu). However, Pu radionuclides of concern have long physical and biologic half-lives (NCRP Report No. 65 p. 89). Had there been sufficient internal Pu contamination to produce significant biologic effects it would now be possible to determine the extent of the previous contamination simply from current urinary Pu levels. Such determinations are performed at present at Brookhaven National Laboratory. There is no need to make assumptions concerning alpha, beta, and gamma radiation ratios. Direct determination of the body burden of plutonium should suffice.

Response

We were not asked, as part of our review of Operation Crossroads, to evaluate the relative merits and possible uses of present diagnostic techniques to determine the extent of contamination within the body from previous radiation exposure. Specifically, Congress assigned that task to the Secretary of Health and Human Services as a part of Public Law 98-542, known as the "Veterans' Dioxin and Radiation Standards Compensation Act." Instead, we were asked to determine the accuracy of DNA's calculation of radiation exposure estimates for Operation Crossroads personnel. In making that determination, we learned that DNA had estimated the alpha radiation hazard present at Operation Crossroads based on the assumption that a constant ratio existed between that radiation type and beta and gamma radiation. Having found information, however, that the alpha-beta-gamma ratio was not constant at the operation and the use of a constant ratio could understate alpha radiation by a factor of 5 or even 10, we recognized that fact in our report and recommended that DNA adjust its radiation exposure estimates accordingly.

Comment 13

There is no doubt that film badge readings depends upon knowledge of the quality of radiation. It is therefore not impossible that errors as large as 100 percent or even higher may easily occur. However, it should be appreciated that among the 80,000 survivors of the Hiroshima-Nagasaki bombings who received in excess of 10 rems there were only an estimated 250 radiation-related cancer deaths among the 4500 cancer deaths expected in that population by 1978 if they had no radiation exposure (Radiat. Res. 90,395, 1982). Furthermore, there were fewer cancer deaths than expected in those who had exposures in the 0-9 rem range.

Response

It is our understanding that any definitive statements about the radiation exposure doses received by the survivors of the Hiroshima-Nagasaki bombings may be subject to revision. As stated in an earlier response, according to an article entitled "Delayed Biomedical Effects of the Bomb" in the August 1985 issue of the Bulletin of the Atomic Scientists, serious challenges beginning in 1981 have been raised about the accuracy of many of the factors that have been used to assign radiation dose estimates to those individuals who survived the Hiroshima-Nagasaki bombings. A joint United States-Japanese effort is now in progress to reevaluate radiation dose estimates, but the article indicates that it is already clear that previous dose estimates will, in most cases, be reduced, although the extent of the reduction will vary from individual to individual. Again, the article points out that, except for leukemia, the understanding of the carcinogenic effects of exposure to the Hiroshima-Nagasaki bombs remains rather incomplete.

Comment 14

It does not seem reasonable therefore to be concerned with whether the exposures of the 11 badges which were read as being in the 1-2 rem range were really 100 percent higher. There is nothing in the GAO report that suggests that gamma-radiation exposure of the participants in Operation Crossroads could have been in excess of 10 rems. Since there are no radiation related cancers reported to be associated with external beta radiation and since the question as to whether there was internal contamination with plutonium can be determined directly now from measurements on urine, it is only the gamma-exposure which is relevant.

This GAO report appears to have little scientific merit. Perhaps this is why there is no listing of knowledgeable consultants who assisted in its preparation.

Response

The purpose of our review was not to reach new, scientifically valid conclusions regarding the likely biological effects to be expected among the Operation Crossroads population. Rather, we deliberately limited our evaluation to the accuracy of the radiation doses estimated for those individuals who participated in Operation Crossroads. Having found that certain factors were not considered in estimating those radiation doses, we recommended that appropriate actions be taken to adjust the estimates to take these other factors into consideration. As mentioned earlier, the Veterans Administration stated that it appears that the actions we support for adjusting radiation exposure estimates should also be applied to participants of all atmospheric nuclear tests--certainly an endorsement of the merits of our findings.

EXPERTS OR SPECIALISTS CONTACTED DURING GAO'S REVIEW OF RADIATION SAFETY AT OPERATION CROSSROADS

In the area of blast effects from a nuclear detonation:

- Mr. Walmer Strope, former Crossroads participant, former head of the engineering and operating division at the Naval Research Development Laboratory, former Director of Research at the Defense Civil Preparedness Agency, now with the Center for Planning and Research.

In the area of film badge dosimetry:

- Dr. Margarite Uhrlich, U.S. National Bureau of Standards, who also reviewed our section on film badge dosimetry and concurred with its findings.
- Dr. Allan Brodsky, U.S. Nuclear Regulatory Commission.
- Mr. Robert Fredericks, Reynolds Electrical and Engineering Company.
- Mr. Jay Brady, Reynolds Electrical and Engineering Company.
- Dr. Gerhard Dessaurer, former head of the dosimetry section, Operation Crossroads.
- Mr. Robert Golden, formerly with the Health Physics Division of Eastman Kodak Company.
- Dr. Murray Cleare, Eastman Kodak Company.

In the area of alpha radiation present following a nuclear detonation:

- Dr. Herbert Scoville, former Crossroads participant and former head of the technical analysis section of the Joint Crossroads Committee.
- Mr. Jerry Goetz, Science Applications Incorporated.
- Mr. Fred Scott, radiochemist, Westinghouse Hanford Company.
- Mr. Bill Matsomoto, radiochemist, Westinghouse Hanford Company.

In the area of medical effects from radiation exposure:

- Dr. Robert Conard, former Crossroads participant and former head of the Marshall Island Medical Program at the Brookhaven National Laboratory.

- Dr. Eugene Cronkite, former Crossroads participant, now with the Brookhaven National Laboratory.
- Dr. David Bradley, former Crossroads participant, now with Dartmouth College.
- Dr. K. F. Eckerman, Health and Safety Research Division, Oak Ridge National Laboratory.
- Dr. Lauriston Taylor, National Council on Radiation Protection and Measurements.
- Dr. David Kocher, Health and Safety Research Division, Oak Ridge National Laboratory.
- Dr. Harold Wycoff, National Council on Radiation Protection and Measurements.

In the area of dose reconstruction:

- Dr. John Bailor, Harvard School of Public Health.

Mr. John F. Ahearne, former chairman of the U.S. Nuclear Regulatory Commission, reviewed GAO's overall investigation findings and conclusions.

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

RESOURCES, COMMUNITY,
AND ECONOMIC DEVELOPMENT
DIVISION

MAR 11 1986

The Honorable Frank H. Murkowski
Chairman, Committee on
Veterans' Affairs
United States Senate

Dear Mr. Chairman:

This letter is to confirm the agreements reached on January 10, 1986, when we met with several members of your Committee staff, including Tony Principi, and Jonathan Steinberg, to discuss the follow-up requests resulting from our recent report and testimony on Operation Crossroads. An identical letter is also being sent to Senator Cranston. This meeting was necessary given the multiple requests that GAO had received for work relating to the various aspects of radiation safety of atomic veterans.

Specifically, Senator Cranston, as Ranking Minority Member of the Committee, in a letter dated November 15, 1985, asked us to undertake essentially three efforts: (1) investigate experiments conducted as part of the nuclear weapons test known as Operation Redwing during which manned aircraft were sent through nuclear clouds to measure doses to aircrews; (2) review radiation safety at a nuclear weapons test at the Nevada Test Site in the 1950's; and (3) determine whether any changes are needed in the regulations promulgated by the Veterans Administration and the Department of Defense in accordance with Public Law 98-542, known as the "Veterans' Dioxin and Radiation Exposure Compensation Standards Act", and also prepare a series of worst-case scenarios of possible levels of radiation exposure for Crossroads personnel. In addition, during the Committee's December 11, 1985, Operation Crossroads hearings, you requested that we determine the level of radiation exposure to Crossroads personnel after implementation of our Operation Crossroads report recommendations and also that we develop a worst-case scenario to determine possible levels of radiation exposure for Operation Crossroads personnel. Further, Chairman Markey, Subcommittee on Energy Conservation and Power, House Committee on Energy and Commerce, in a letter dated December 11, 1985, also requested us to review manned air flights through nuclear clouds at Operation Redwing, including how many ground personnel were involved in decontaminating aircraft and what doses these personnel received.

Because of these multiple requests, it was recognized that an understanding had to be reached on the request work we could undertake to maximize the use of our resources. The following is a listing of that work we agreed to perform for the Committee.

--In view of the findings of our Operation Crossroads report, we will determine whether any changes are warranted in the regulations promulgated by the Veterans Administration and the Department of Defense in accordance with Public Law 98-542, known as the "Veterans' Dioxin and Radiation Exposure Compensation Standards Act".

--We will advise the Committee on the status of a review, mandated by Public Law 98-542, regarding the reliability and accuracy of the scientific and technical devices and techniques (such as "whole body counters") which may be useful in determining previous radiation exposure. (Public Law 98-542 had directed the Secretary of Health and Human Services to report the results of this review to the Senate and House Committees on Veterans' Affairs by July 1, 1985.)

--We will investigate certain experiments during the 1956 nuclear weapons test, known as Operation Redwing, in which manned aircraft were sent through nuclear bomb clouds to measure radiation doses to aircrews. Specifically, we will determine the extent of exposures to radiation experienced by the Operation Redwing plane crews, whether other individuals were similarly exposed during other detonations, and whether the Department of Defense or other entity has followed up with these individuals to determine and monitor their health status.[1]

--We will perform a review of radiation safety at a nuclear weapons test at the Nevada Test Site in the late 1950's. This review will be similar to the one we did for Operation Crossroads. The timing and scope of this review will be decided after the above work on the regulations, whole body counters, and Operation Redwing have been completed.

---

[1] Additionally, in accordance with Congressman Markey's request, we will determine how many ground personnel were involved in decontaminating the planes and the radiation doses they received.

--Recognizing that we do not have the in-house capability to develop a series of worst-case scenarios of the possible levels of radiation exposure for service personnel participating in Operation Crossroads and that our credibility could be impaired for developing scenarios that justified the work we did on Operation Crossroads, Messrs. Principi and Steinberg agreed your and Senator Cranston's office would jointly reevaluate the request that we do such work.

If your staff wishes to discuss or further clarify any of these items, please feel free to contact me on 275-1441 or Carl Bannerman on 353-3712.

Sincerely yours,

Keith O. Fultz

Keith O. Fultz
Associate Director

7215 PARK TERRACE DRIVE
ALEXANDRIA, VA.
22307

20 Dec. 1985

Hon. Frank Murkowski, Chairman
Committee on Veterans Affairs
U. S. Senate
Washington, D.C. 20515

Dear Senator Murkowski:

Enclosed you will find material that I sent to Senator Cranston in connection with GAO Report RCED 86-15 on OPERATIONS CROSSROADS.

A summary of my radiation experience for the 1940-47 period is also enclosed. Since 1947 I have written a number of texts and books on ionizing radiation. I actively consult in radiation litigation.

Since the issuance of the NIH Radioepidemiological report early this year, I have applied the NIH data to various population groups, using the NIH SEER data on cancer epidemiology. In this way I am able to calculated probabilities of causation for various wholebody doses. These probabilities, applied to the rem-range to which veterans were exposed at weapons tests, are in the fraction of 1 percent range.

Sincerely,

R. E. Lapp

rel/la
encl.

Ralph E. Lapp

BRIEF SUMMARY OF RADIATION BACKGROUND [1940-47]

My radiation experience dates from x-ray research begun in 1940 under Prof. Arthur H. Compton at the University of Chicago. B.S. and Ph.D. awarded by the university. I was employed by the Metallurgical Laboratory during the war and engaged in research with radioactivity. I was Division Director of the Laboratory in charge of development and small scale production of instruments designed to measure ionizing radiation. Some 60 different electronic devices were devised for use on the A-bomb Project. As assistant Director of the Laboratory [today known as the Argonne National Laboratory] I headed up a task force of scientists and technicians in radiation monitoring for both the Able and Baker tests in 1946.

In 1947 in collaboration with Dr. Howard L. Andrews [then in the Public Health Service] I wrote Vol. 1 of RADIOLOGICAL SAFETY. This was a report on nuclear instrumentation published by the Armed Forces Special Weapons Project based on OPERATIONS CROSSROADS. [A copy of pp 142-44 is enclosed to illustrate the state of knowledge of photo dosimetry in 1946. Note that the use of a Pb cross over the photoemulsion is indicated for beta discrimination.]

7215 Park Terrace Drive
Alexandria, Va.
22307

16 Dec.1985

Hon. Alan Cranston
U.S. Senate
Washington, D.C. 20515

Dear Senator Cranston:

You may be very puzzled, as I am, by the GAO OPERATIONS CROSSROADS report. On one hand, if there were cancer-causation due to weapon-produced radiation, compensation of personnel might be considered. On the other, cancer strikes at 1 in 4 of all people and reason demands that the radiation exposure be causative within reasonable doubt.

I was technically in charge of PGM-32, the first radiation monitor to enter the Bikini lagoon after the Baker shot. I had my own radiation survey meters and dosimeters on board as well as a number of technical assistants. I recall penetrating close in to the center of the target fleet. In the process the PGM became contaminated above the 0.1 R/day limit and we had to secure operations. We anchored off an island in the lagoon and the crew was removed. The skipper then informed me that he could not leave without violating the Articles of War, so the two of us spent the night on board until we were relieved the next day.

My own instruments [pocket dosimeters were developed in The Metallurgical Laboratory] showed that I did not exceed the 0.1 R/day limit. Later, a film badge measurement indicated that I received 0.1 R from July 28 through Aug.3rd. I would add that as a radiation monitor I boarded contaminated ships after the Baker shot and I believe that I could be considered a high exposure individual.

I am therefore puzzled by the GAO report which overlooks the bottom line--the real extent of Crossroads exposure--while concentrating in great detail on trivial issues. Even if I had received 100 times more exposure than I did, it would only be 10 rem or less than I have received from the natural environment and medical radiation.

If the U.S. Government were to compensate Bikini cancer cases, then the courts would be swamped by a flood of litigation that would bankrupt the medical profession which commonly employs medical radiation for many millions of diagnoses.

Sincerely,

Ralph E. Lapp

Ralph E. Lapp

rel/la
encl.

7215 Park Terrace Drive
Alexandria, Va.
22307

16 Dec 1985

Hon. Charles A. Bowsher
Comptroller General
Washington, D.C. 20548

REF: GAO/RCED-86-15

Dear Mr. Bowsher:

The enclosed copy of my letter to Senator Cranston illustrates my concern that your GAO report on OPERATION CROSSROADS failed the address the overall issues involved in this situation.

First, I am uneasy when I pick up a GAO report and cannot identify any authorship.

Second, my distress is not relieved when I find that much ado is made about issues which are not significant. It's true that the state of the art in radiation measurement was less advanced than today, but it was far from primitive as my attachment should make clear.

Third, I really get perturbed when I see the GAO authors disregarding the technical comments made by concerned agencies.

Fourth, as a taxpayer I hate to see GAO money going into pursuit of meaningless detail. It really matters very little whether the Crossroads exposure data had a large error band. Pick the highest doses and you still come up with nothing of health significance.

I would urge that you have a number of experts review a report like RCED-86-15 prior to its finalization. I realize that GAO does employ consultants but I think they are not utilized in the final report.

Sincerely,
Ralph E. Lapp
R. E. Lapp

rel/la
encl.

NATIONAL ASSOCIATION OF ATOMIC VETERANS

NAAV

Reconstruction Coordinator, Operation Crossroads
2310 Apollo Way, Mesquite, Texas 75150

"A non-profit organization dedicated to the cause of the Atomic Veteran; who seeks no special favor. . . .simply JUSTICE."

Russell Jack Dann, Chairman
Wm. Gene Phillips, Vice-Chairman
Ford Harrison, Secretary-Treasurer

Directors
Jerry Arney, Gene Curbow,
Luther Hudson, Annie Schaefer

Adjutant General
Lucius Smith III

Special Counsel
Thomas J. Houser

January 15, 1985

Lucius Smith, III
NAAV Headquarters
P.O. Box # 707
Eldon, Missouri 39203361

Dear Lucius,

As outlined in my telephone conversation with you on January 3d, I am reporting the status of "Project Baker" as of January 1, 1986. This update includes the information recently furnished to me by Lieutenant General John L. Pickitt, USAF, Director of the DNA, concerning the life or death status of the Radiological Safety Monitors on my assignment listing for Test Baker at Operation Crossroads.

Three Hundred and forty-nine (349) military and civilian personnel have been identified to date who served in some capacity with the Radiological Safety Section of JTF-1. Two Hundred and thirty-one (231) have been identified as having a duty assignment that would place them in radiologically hazardous areas during Test Baker and follow on operations..

105 of these 231 individuals have been located to date. 19 individuals present status, ie, "Living" or "Deceased" were contained with the information furnished by the DNA. 33 living individuals and 2 deceased individuals have been located, within my resources, and their present address identified. Additionally, DNA and NAAV both have located 48 living individuals and 3 deceased individuals. I still have the task before me to locate the remaining 126 individuals and determine their health histories. I presently lack complete health histories on about 65% of the located individuals.

Most interesting was the information from DNA that five (5) of the 349 individuals on my list have died with colon, liver, pancreas, esophagus and or lymphatic cancer combinations. Additionally, three (3) of these 5 individuals had liver cancer. Using both my information and that sent by DNA, nine (9) veterans have been identified as deceased

DNA has the remaining 126 individuals listed as "Not on Record". This indicates to me that DNA has not utilized the various other government agencies to attempt to locate Crossroads veterans.

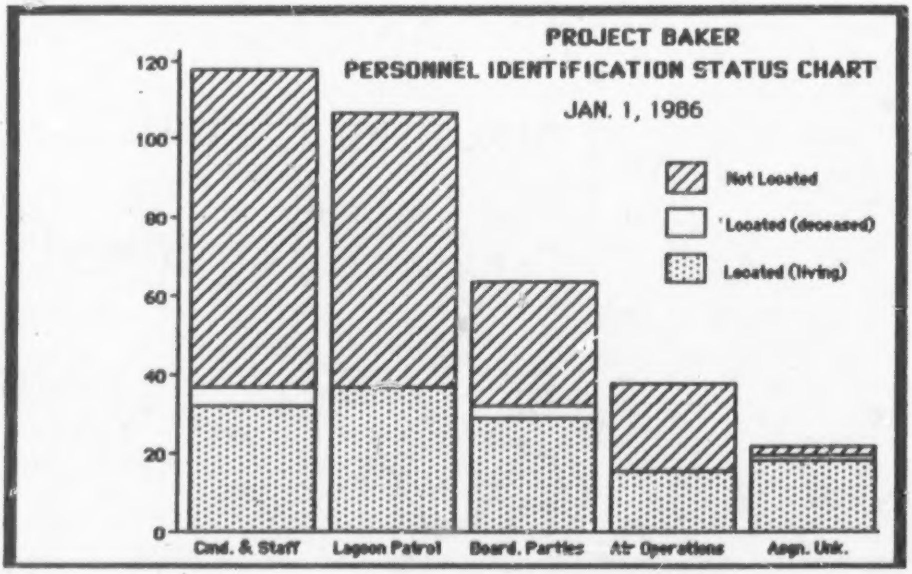
I am enclosing a status chart which displays my progress on the personnel identification phase of "Project Baker".

I remain,

Sincerely,

Oeley H. Caldwell III
Reconstruction Coordinator

Copies To: Senator Alan Cranston
✓Senator Frank H. Murkowski
Senator Paul Simon
Congressman Lane Evans



PROJECT BAKER
PERSONNEL IDENTIFICATION STATUS CHART
JAN. 1, 1986

SECTION	Ident. Living	Ident. Dead	Not Ident.
Cmd. & Staff	32	4	82
Lagoon Patrol	37	0	70
Board. Parties	29	3	32
Air Operations	16	0	22
Asgn. Unk.	18	2	2
Field Total = 349	132	9	208

United States General Accounting Office

GAO

Report to the Honorable Alan Cranston,
U.S. Senate

November 1985

OPERATION CROSSROADS

Personnel Radiation Exposure Estimates Should Be Improved

GAO/RCED-86-15

Executive Summary

Many of the 42,000 military participants in the 1946 atmospheric nuclear weapons test, known as Operation Crossroads, were subjected to varying amounts of radiation exposure. Documents recently discovered by concerned private citizens raise questions about the accuracy of the Defense Nuclear Agency's (DNA) radiation exposure estimates. The Veterans Administration uses these estimates in adjudicating former participants' radiation-related disability claims.

Because of specific Congressional concerns, GAO reviewed certain issues regarding the radiation exposure of Crossroads participants, such as the

- reliability of the personnel film badges used to measure radiation,
- adequacy of the personnel decontamination procedures, and
- accuracy of DNA's radiation dose reconstruction.

Background

Crossroads consisted of two nuclear bomb detonations in the Pacific Bikini Island lagoon from July 1 to August 10, 1946. After each detonation, a task force of approximately 42,000 military personnel and civilian scientists entered the lagoon and examined the damage to and radiation intensities on target ships.

Given the responsibility by the Secretary of Defense to estimate radiation doses for atmospheric nuclear weapons test participants, DNA—in October 1984—issued its report on Operation Crossroads, concluding that personnel had not been overexposed to radiation. DNA's position is based on radiation data recorded on film badges worn by about 6,300 of the 42,000 Crossroads participants and reconstructed external and internal radiation dose estimates for the participants. (See pp. 15 to 16.)

Results in Brief

Crossroads personnel were exposed to four specific radiation types—internal alpha, internal and external beta, and external gamma (see pp. 36 and 37). GAO found that DNA's calculation of exposure estimates for each radiation type may need adjustment because

- film badges were not reliable for measuring both external gamma and beta radiation, as intended, and were not worn by all Crossroads participants;
- personnel decontamination procedures did not provide adequate protection for Crossroads personnel throughout the operation; and

- DNA's dose reconstruction analysis for internal alpha and beta radiation has not properly estimated the possible personnel exposure from three potential pathways—inhalation, ingestion, and open wounds.

Principal Findings

Reliability of Film Badges

DNA's radiation exposure estimates have made no allowance for inaccuracies attributable to film (in badges) or its processing. GAO found and DNA acknowledges that the recorded film badge readings would have had an overall inaccuracy of approximately ± 30 percent because of inaccuracies in the film.

Further inaccuracies normally occur during film processing and reading. While it was not possible to calculate actual Crossroads inaccuracies, GAO found that a mid-1950's U.S. National Bureau of Standards test showed that readings by several laboratories of film badges similar to those at Crossroads, exposed to known amounts of radiation, were inaccurate by as much as ± 100 percent. GAO believes it is unlikely that the film badge readings performed under harsh Crossroads conditions would have been more accurate than those in laboratories.

DNA recognizes the film badges at Crossroads were incapable of accurately recording external beta because the portion of the film intended for that measurement actually recorded both external gamma and beta. Although DNA assigned doses to personnel believing the badges overestimated external beta radiation, GAO found cases in which beta exposure may have been underestimated or not estimated at all.

Adequacy of Personnel Decontamination Procedures

Because DNA believes adequate personnel decontamination procedures existed from the beginning at Crossroads, its radiation exposure estimates do not recognize the possibility that personnel may have retained radioactivity on their bodies and clothes after working on contaminated target ships. In contrast GAO believes this possibility exists because decontamination procedures were evolving at Crossroads. For example, the earliest evidence that GAO found of personnel being required to shower or change clothes after returning from contaminated target ships was in procedures issued on July 31, 1946, 6 days after the second detonation. Moreover, even after comprehensive decontamination procedures were instituted, some violations were reported. Thus, Crossroads participants were probably exposed to more radiation than accounted for by DNA.

Accuracy of Internal Exposure Dose Reconstruction

Internal radiation exposure was not measured at Operation Crossroads. DNA has estimated the exposure from inhaling radioactive materials but used a constant ratio between alpha, beta, and gamma radiation that may have underestimated alpha radiation by a factor of from 5 to 10. Moreover, DNA has not evaluated internal radiation exposure from ingestion and open wounds. DNA believed, incorrectly, a prohibition against food consumption aboard target ships effectively precluded ingestion and did not know how to calculate for open wounds.

Recommendations

GAO recommends that the Secretary of Defense direct DNA to adjust, where feasible, the Crossroads participants' exposure estimates in the following manner:

- develop a range for each film badge reading that recognizes film and film processing inaccuracies; reassess the accuracy of the external beta radiation dose information for those who wore film badges and, because not all wore film badges, perform a dose reconstruction for external beta radiation;
- estimate the extent to which personnel received radiation exposure from a lack or violation of comprehensive decontamination procedures;
- reevaluate and disclose the possible errors or uncertainties associated with its analysis of internal radiation exposure by inhalation and analyze possible internal radiation exposure through ingestion or open wounds.

In addition, where any of the preceding actions have been determined not to be feasible, GAO recommends that the Secretary of Defense require DNA to document the reasons for each such determination so that the military services can provide this information to the Veterans Administration and the affected veterans.

Agency Comments

The Department of Defense generally disagreed with the report's findings, conclusions, and recommendations. However, GAO's analysis of its comments showed that the Department (1) provided incorrect or unsupported statements, (2) misinterpreted certain Crossroads-related documents, or (3) presented information inconsistent with DNA's historical report on Operation Crossroads and other material. For these reasons, GAO continues to believe that the Department can improve radiation exposure estimates for Crossroads personnel by effectively addressing and implementing GAO's recommendations. (See p. 56 for GAO's evaluation of the Department's positions on the issues discussed in the report and see appendix IV for GAO's detailed evaluation of the Department's comments.) The Veterans Administration stated that the report's recommendations for calculating radiation doses for Crossroads participants should also be applied to participants in all other atmospheric nuclear tests (see app. III).

Review of the Methods Used to Assign Radiation Doses to Service Personnel at Nuclear Weapons Tests

Committee on Dose Assignment and Reconstruction for
Service Personnel at Nuclear Weapons Tests
Board on Radiation Effects Research
Commission on Life Sciences
National Research Council

NATIONAL ACADEMY PRESS
Washington, D.C. 1985

EXECUTIVE SUMMARY

Between 1945 and 1962, about 203,000 military personnel, including civilian employees of the Department of Defense, participated in atmospheric nuclear weapons tests conducted at proving grounds in the southwestern part of the United States and in the Pacific Ocean. The Defense Nuclear Agency (DNA) has been assigned the responsibility for developing radiation dose estimates for all the participants at the tests. The decision to undertake the dose-assignment program was prompted by claims made by veterans and their families that the participants' health was damaged by exposure to ionizing radiation during or after the weapons tests. DNA instituted a program of dose assignment, known as the Nuclear Test Personnel Review (NTPR), and asked the National Research Council to review the scientific aspects of the program. The Board on Radiation Effects Research in the Research Council's Commission on Life Sciences thereupon formed the Committee on Dose Assignment and Reconstruction for Service Personnel at Nuclear Weapons Tests.

The NTPR involves the collection and processing of an extraordinary amount of information, and a major problem encountered by the Committee was that no single report summarizes the scope of the NTPR, the procedures used, and the uncertainties involved in the dose assignments. It was not feasible for the Committee to review all the material used by DNA in the NTPR. After consultation with DNA, a list of all reports used in the dose-assignment project was examined. The Committee then selected a number of the reports that described the various methods used in the dose assignment procedures. The reports submitted to the Committee for review and the formal presentations were devoted primarily to methods used by the Navy NTPR team, which are different in detail from but similar in overall design to those used by the other service teams. Therefore, comments and conclusions concerning the scientific credibility of the dose assignments are applicable mainly to the 107,000 Navy personnel (53% of the total) for whom the Navy NTPR methods were used and are applicable to other personnel to the extent that the Navy NTPR methods were used for them.

The principal sources of information on external radiation exposure are film-badge records that have been compiled into a master file by the Reynolds Electrical and Engineering Company, which has been involved in test site management for many years. This file contains more than 230,000 entries on about 143,000 of the 203,000 personnel. The design of the film badges, the methods of film processing, and the densitometric techniques and calibration procedures were relatively crude during World War II, but improved substantially during the 18-year period during which atmospheric weapons tests were conducted. On the basis of studies conducted by the National Bureau of Standards under controlled conditions during the 1950s, it is estimated that the film-badge data have a positive bias of about 45% (i.e., the badges read too high), and that their random uncertainty is about ± 100% between the minimal detection level and 100 mR and about ± 40% above 100 mR for gamma radiation exposure. Measurement of beta radiation exposure was nonexistent or of uncertain quality during the period of atmospheric testing, and external beta doses are not routinely calculated. The Committee notes in this connection that the dose from external beta radiation would be limited to the skin and would be greatly attenuated on those parts of the body covered by clothing.

The Committee found that the procedures used to estimate external radiation doses were reasonably sound. The procedures followed by DNA to estimate external doses depend on the kind and amount of information available. In the ideal case, a complete film-badge record is available, but it cannot always be ascertained that the film-badge records accurately reflect a person's total exposure throughout his participation in the nuclear tests. In the least favorable case, no film-badge data are available, and the estimate can only be inferred from other information; in such cases, the dose is reconstructed from information on a person's work schedule and records of survey meter measurements. When an unbadged person belonged to a group of which some members wore film badges, the dose assigned by the Navy to that person was the 95th percentile dose received by group members to whom badges were assigned. This procedure has the effect of increasing the dose estimates for most veterans whose dose was assessed in this way.

The NTPR has developed procedures that permit satisfactory estimates to be made of the external doses received by these participants. There are uncertainties in the dose estimates, but it appears that 99% of the personnel received doses of less than 5 rems, which is approximately the average dose received by the general population during the last 30 years from exposure to natural radiation and the use of ionizing radiation during medical procedures. The Committee believes that NTPR efforts in the future would be more productive if they were designed to determine, with a high degree of certainty, whether the dose received by a given person is less than some stated cutoff. The choice of a criterion dose is arbitrary, but 5 rems can be justified on the basis that an average participant would receive about that dose to his whole body from natural background radiation over a period of 50 years, or in 30 years from background plus medical and dental x rays.

Methods used to assign internal doses associated with inhalation or ingestion of radioactive material were in general based on unsupported assumptions. The methods often attempted to relate internal dose to the magnitude of external radiation and tended to overestimate possible internal doses. There is considerable evidence that, with the exception of doses to the thyroid, doses to any organ from internal emitters were far smaller than the external dose. The Committee came to this conclusion from follow up data obtained from Bikini natives, Japanese fishermen, and veterans who had been exposed to fallout from Shot Smoky. For these groups, modern methods of radiochemical analysis of urine and whole-body counting make it possible 20 or 30 years after exposure to set upper limits of dose commitments as low as 500 mrems from exposure to strontium-90 and plutonium-239.

Although the Committee concentrated only on methods, it found no evidence that the NTPR teams had been remiss in carrying out their mandate. If any bias exists in the estimates, it is probably a tendency to overestimate the most likely dose, especially for internal emitters or when the statistical procedure for assigning dose is used. The Committee does recommend that DNA prepare a comprehensive document that summarizes the procedures used and makes estimates of the uncertainties involved. Although the Committee also believes that estimates of internal doses could be improved, it hesitates to recommend a large effort to do so, in view of the minor impact on total doses expected. No matter what improvements are implemented, the Committee believes that further efforts to improve methodology are more likely to be fruitful if concentrated on doses expected to be at the higher end of the scale, for example above 5 rems.

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From Now
for all time . . .

(207) 871-8668

Testimony of:

Robert L. Campbell
Post Commander
Amvets Trinity Post 7-45

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As Post Commander of America's only nationwide Post of any recognized veteran's organization whose membership consists solely of Atomic Veterans, I thank the Senate Veterans' Affairs Committee for this opportunity to appear before the committee and to comment upon the General Accounting Office's (GAO) report on Operation CROSSROADS. First I would like to thank Senator Cranston for requesting the CROSSROADS report and the GAO for their diligence in producing this unbiased document. Further, I am indebted to our own Senator Mitchell for his inviting me to be here today and to otherwise participate in this proceeding.

Although I am a veteran of Operation GREENHOUSE, because of my position of Department Service Officer, AMVETS Department of Maine, I have been called upon by Atomic Veterans from all across our great land for assistance with their claims. As a result of these requests I have become quite knowledgeable with many other operations relating to the atmospheric testing of nuclear weapons.

I first became involved in researching Operation CROSSROADS at the specific request of a daughter of a deceased veteran who took part in the 1946 Bikini tests. Interestingly enough the daughter of this veteran was born with several genetic defects including three extra bones in each of her feet, plus genetic problems with her son. This veteran was a crewman aboard the USS ATR-87, an ocean-going tug built with a wooden hull at a cost of more than $1 million and subsequently sold for less than $9,000 at a public auction within a year after its participation at the Pacific test site. Both this veteran and his former commander officer died of early age cardiovascular diseases.

It is interesting to note in the Defense Nuclear Agency (DNA) Fact Sheet on Operation CROSSROADS, dated March 3, 1982, as pertains to Test Able, that:

> "Initial boarding teams (composed of a radiological safety monitor, medical safety officer, technical representatives of the Director of Ship Material and Salvage Unit personnel began survey operations four hours after Test Able...However, by 2:30 p.m.

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> the lagoon was declared safe for the return of all vessels."

The official U. S. Navy Deck Log for the ocean-going tug, ATR-87, contains the following entry for July 1, 1946:

> "1219 Maneuvering on various courses and speeds conforming to the channel. Entering Bikini Lagoon."

From the above it is immediately apparent that the ATR-87, acting on official orders, entered Bikini Lagoon approximately two (2) hours and eleven (11) minutes before "the lagoon was declared safe for the return of all vessels." Indeed the Deck Log of the USS ATR-40, sister ship of the ATR-87, gives that vessel's time of entry into the lagoon as being "1313 hours," which was approximately one (1) hour and seventeen (17) minutes "before the lagoon was declared safe for the return of all vessels."

The GAO Report (p.64) contrasts recommendations made by the Radiological Safety Officer and the command response. The first item mentioned is that "all fresh water tanks should be filled prior to the entry of any ship into contaminated water, and no ships should operate their distilling plants unless absolutely necessary." The Deck Log of the ATR 40 for the period July 2, 1946 (immediately following Test Able) to July 25, 1946, records that approximately 26,050 gallons of water from Bikini lagoon was distilled for drinking, cooking and other sanitary purposes; during the period July 25, 1946 (immediately following Test Baker) to August 18, 1946, the ATR-40 Deck Log records approximately 27,345 gallons of lagoon water being distilled for drinking, cooking and other sanitary purposes.

The above distillation report becomes more than merely significant when the following quotation from "Bombs At Bikini - The Official Report of Operation Crossroads - Prepared under the Direction of the Commander Joint Task Force One by W. A. Shurcliff, Historian of Joint Task Force One" where, on page 167 one reads, on the subject of Test Baker:

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> "The degree of radioactive poisoning of water and ships was impressive. The total amount of radioactive materials released was initially equivalent to hundreds of tons of radium. Some of the radioactive material drifted off in the cauliflower cloud; but much remained in the lagoon area. The base surge, in its precipitant flight outward from the column, carried radioactive materials. It drenched the target vessels and left them radioactively poisoned."

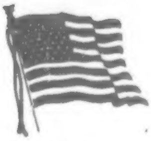
This statement becomes increasingly important when it is multiplied by the number of other ships which returned to the lagoon following Test Baker and distilled water from the lagoon. However, it is interesting to note that the USS Haven, a hospital ship present at the test, was ordered not to return to the lagoon following Test Baker. The September 16, 1946, Third Report, Investigation of Radioactivity of Vessels from Bikini at the San Francisco Naval Shipyard, begun September 5, 1946, reports that:

> "An evaporator and a condenser on the hospital ship, USS Benevolence, were monitored yesterday by Lt. Comdr. Skow (MC) with expected results. The reading through the evaporator shell was not particularly high, but scale in the evaporator (which had been cold shocked previously) was found to have a radioactive emission double the normal tolerance of human beings for gamma and beta rays."

Given this statement, the question then follows what were the actual conditions of the evaporator and condenser on the USS Benevolence while at Bikini?

A statement in the official Joint Task Force One history contains the following statement, which, retrospectively, creates more questions than answers:

> "Over 90 percent of the target vessel array fell victim to radioactivity. The extent of radiological hazard went beyond what had been expected."



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The situation at Bikini immediately following the two tests became the center of a pointed discussion at a Navy conference on October 1, 1946, where a Dr. F. H. Rodenbaugh observed (Vol 3, pg. 67, Director of Ship Material, Technical Report "Radiological Decontamination of Target and Non-Target Vessels) in a conversation with several others:

> "The decision wasn't easy to make - you could not measure the substance and so the operation was stopped at Bikini. The health hazards of radiation - I have seen a lot of late reactions. I would be very loath indeed to feel that we should take any chance on these hazards until we know more about it. The only protection you have against these things is to stay away from it."

Two questions arise from the above. First, if this was the feeling of the Department of the Navy on October 1, 1946, what then was the operating thesis of Joint Task Force One at the time of the tests? Secondly, specifically what was the causation of the "late reactions" noted by Dr. Rodenbaugh and where are the official health records of the men who suffered these late affects?

At a subsequent "Conference Concerning Radiological Decontamination" held October 14, 1946 (also cited in Vol. 3, page 77), a physician's comments are recorded:

> "Dr. Hamilton said that at present the establishment of standards is mainly guess work and calculated risk."

Again the question is, if this was so on October 14, 1946, what was the official Joint Task Force One policy during the actual tests in July 1946?

Therefore, given the above recommendation of the radiological safety officer regarding distillation of water, a recommendation which was ignored, the actual distillation of water, and then the statements contained in the official history it becomes apparent that the history's author was aware of certain findings which, to date, have never heretofore been communicated to test veterans.

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Concerning the subsequent auction and sale of the ATR-87 at the Bremerton Naval Yard following its return from Bikini, a copyrighted story appearing in the Monday, June 27, 1983, edition of the Bremerton Sun, contains the following:

> "Radiation levels on the wooden-hulled rescue tug ATR-87 had dropped sufficiently for the Navy to grant it radiological clearance, but the ship was never completely decontaminated before being put up for auction by the Maritime Commission.
>
> "And the man who bought it had no idea he was purchasing a 'hot' ship."

Dr. David W. Bradley, M.D., professor Emeritus of Dartmouth College, Hanover, N.H., who is testifying here today, wrote in his account of the 1946 Bikini tests "No Place To Hide" that the only way wood could be decontaminated was to plane it down one-quarter inch. A similar notation is also found in the Stafford Warren papers. Therefore, for the ATR-87 to have been satisfactorily decontaminated, it would have been necessary to plane the entire wood surface of the vessel. My research has yet to provide any evidence that the ATR-87 was planed before being sold.

It is also interesting to note, again as reported in the Bremerton Sun article:

> "The ATR was included in the Navy's list of 'radiologically suspect' ships following Baker. But on Sept. 4, an inspection party boarded the tug and declared it 'radiologically safe' after a 15-minute visit."

In a telephone conversation with the author of this article, I learned that at least six (6) other contaminated ships which had been returned from Bikini to Bremerton for further decontamination work, were opened to public access for Navy Day ceremonies at the Washington State shipyard on October 27, 1946.

Testimony of: Robert L. Campbell
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Compare the above mentioned 15-minute inspection of the ATR-87 to a comment made by Dr. Stafford Warren in a letter to Admiral W. S. Parsons dated January 6, 1947:

> "The distribution of the contamination in a complicated structure like a ship is spotty and irregular, making localization and measurement of potentially hazardous spots very difficult."

The ATR-87 was appraised, according to official Navy records at nearly $1.3 million, but was sold for $8,625.00, on May 18, 1948, concurrently with the sale of four other ATRs.

The ship's Deck Log indicates no record of having been planed or having been drydocked for appropriate decontamination measures. Dr. Warren clearly advised, in an August 13, 1946, memo to Commander Task Group 1.2, that:

> "Wooden surfaces because of their grain are known to absorb those [radioactive] materials deep within their substance and therefore cannot be cleaned without removal of the surface."

The ATR-87 Deck Log states, on Friday, September 20, 1946, it is enroute from Johnson Island to Pearl Harbor (and thereafter to Puget Sound Naval Shipyard, where it arrived November 27, 1946).

In the lengthy, extensively researched and documented copyrighted article published in the Bremerton (Washington) Sun, regarding the radioactive exposure to the public and Puget Sound Naval Shipyard (PSNS) workers during the testing or decontamination of 18 "hot" ships from Operation CROSSROADS, one reads of numerous interviews with PSNS workers who recall: that shipyard officials decided no special radiation protection was necessary for working on non-target vessels; that workers were not informed about the ships' presence in contaminated areas; that even on clearly radioactive non-target ships, the overhaul proceeded "like any other overhaul."

To be noted is a December 4, 1946, memo from the Bureau of Ships to PSNS and other Navy shipyards advising that all

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procedures for disposing of contaminants removed from ships be "treated as routine in order to minimize any adverse publicity."

In the midst of "unexplained" catastrophic illnesses now afflicting many PSNS workers, one man recalls a co-worker who "got so hot being down there in the ship, his badge showed just total radioactivity." When he was removed from the work area, his hair had turned white.

Bill Atkins, a sailor aboard a non-target vessel, the USS Ajax, recalls the ship becoming so contaminated while anchored in Bikini lagoon, that the vessel's heads had to be ripped out because of the use of sea water had made the area too "hot" to use. This veteran also recalls reporting to sick bay with other crewmen at intervals for blood tests to measure possible radiological contamination, but when he requested his medical records, all notations were missing regarding any medical procedures or treatment during CROSSROADS -- indeed, no indication that he was even present at Bikini, despite his having seen his records exist on the desk before him and personnel during sick bay visits. He has virtually no chance to prove radiation damage for his many severe medical problems.

Perhaps you can understand why I have great difficulty reconciling the personal accounts given by veterans present at Operation CROSSROADS compared to the August 23, 1985, letter from Donald A. Hicks (DOD) to Mr. Frank C. Conahan (GA)) which states:

> "At Crossroads, the radiation exposures were low.... The average exposure to the 42,000 CROSSROADS personnel was about 0.390 rem."

and in further advance comments from the DOD (GAO p. 92):

> "7. Medical records for CROSSROADS veterans do not indicate any evidence of beta exposure, or any other symptoms attributable to radiation. This indicates that all external beta exposures were low level, which in any case would not cause any long term medical effects."

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The contention of the Department of Defense that "safety precautions were better developed and used as in later trials" [See: page 68, GAO Report on Operations CROSSROADS] simply does not compare to the actual facts as stated in the government documents herein cited. Further, that subsequent test operations were conducted with greater scientific accuracy, as is asserted by the DOD, again does not stand up to scrutiny. As an example I draw the Committee's attention to Operation GREENHOUSE conducted at Eniwetok Atoll in April and May 1951.

Concerning the badging of personnel at Operation GREENHOUSE, the following information is but a relative sampling of many such entries contained in the official Scientific Director's Report:

> "Use of dosimeters at Operation GREENHOUSE indicated a great need for 2 and 5r instruments which were not available. It is extremely difficult to measure doses for a 700-mr mission on 10-r dosimeters, and some accuracy is lost in reading doses for a 3-r mission." (Page 36)

In fact, the DNA Document WT-111 (EX) [Extracted Version] Operation GREENHOUSE, Volume 11, Scientific Director's Report, Part III, Evaluation of Programs 3 to 6 and 8 (October 1, 1979), contains the following entry:

> "3.3 RESULTS
>
> 3.3.1 Evaluation of Ground Radiac Equipment
>
> (a) Dosimeters. No dosimeter was found to be entirely adequate within the scope of field usage and the military characteristics. Although some instrument types were consisttent in themselves, little intercorrelation was observed. The problems of calibration, sensitivity, accuracy, energy dependence, rate dependence, leakage, decomposition, photosensitivity, reliability, and ruggedness still have not been completely solved. Dosimeters which reacted favorably in some respects failed in others."

Testimony of: Robert L. Campbell
Post Commander
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Thus, if the dosimeters used in 1951 were found to be not adequate, one can only speculate on the dosimeters used in 1946, some five years previous to the GREENHOUSE experiments.

Further, a September 1980 DNA letter to Senator William S. Cohen, discussed the subject of fallout at Operation GREENHOUSE. States this letter:

> "The fallout was measured for intensity and characterized as to whether or not it constituted a biological hazard. Based on the investigations that were done, it was determined that the fallout radioactivity did not constitute an internal hazard. The particles were quite large -- 100 microns and larger in diameter -- thus the probability of inhalation was quite low -- to be an inhalation threat, particle sizes of 10 microns or less are required."

However, in the same document just cited regarding dosimeters, the following entry is contained on page five:

> "One rather unexpected result of the tests was an indication that a surprisingly large portion of the radioactivity might have been carried on submicron particles which were too small to be filtered out by the normal filter methods. This was first suspected when the activity collected on the filter papers failed to account for the actual ionization by a factor of greater than 50."

Therefore, the assertion that the fallout was too large in size to be inhaled or otherwise ingested is at odds with official documentation. In fact, this fallout becomes increasingly more significant when it is noted, as published by the DNA, that three of the four devices detonated at Operation GREENHOUSE created considerable fallout.

Personnel at this test series were exposed to several fallouts during the entire proceedings and is well documented in official DNA literature. In studying this situation the DNA contacted several persons who were present at the test site in 1951 and asked them for their input which was subsequently corroborated with documents in the DNA's possession. What was at issue in this research was a special meeting held in April 1951, after the first device (Shot Dog) was fired. In a memorandum dated June 11, 1981, Dr. Payne Harris, M.D., one of those present at the special meeting, wrote a memo to the Navy NTPR office. Subject: Information on GREENHOUSE, the author writes:

"Fallout on the 'living islands' occurred on three shots of the GREENHOUSE series. These were Dog, Easy and Item shots.

"The Dog shot fallout began at about h+3 hrs. on Eniwetok, Parry and Japtain Islands....This group evaluated the situation and concluded the following:

"4. Usual personnel activities would continued 'ad libitum.' If a person worked inside, he stayed inside. If a person had nothing to do, he went swimming, slept or whatever.

"5. Finally, and most important there would be no disruption of 'living island' routine."

This report is absolutely naked of any reference of either warning personnel or arranging subsequent medical checkups. Further, the report is absent any references to a fourth living island, namely Engebei (also a test island) on which lived still more military personnel, plus civilian employees of the civilian contractor, Holmes & Narver Company.

It is now noted for the record that actual human experimentation with radiation was conducted upon the bodies of ten military persons at Operation GREENHOUSE. The purpose of the experiment was to determine whether radiation could be washed off using various soaps. Five of the ten men were given special detergents to use while the other five were given plain water. The arms of all ten men were contaminated with radioactive soil from their elbows to their fingertips. The experiment was conducted several times. And, as this Committee is well aware from its recent hearings, evidence of human experimentation at Operation REDWING came to your attention. Also, human experimentation can be documented for occurring at Shot Kepler during Operation PLUMBBOB, the test series which produced the infamous Shot Smoky.

I now call to the Committee's attention Resolution 95(I), "Affirmation of the Principles of International Law Recognized by the Charter of the Nuremburg Tribunal," adopted by the General Assembly of the United Nations (11 December 1946). An outgrowth of this resolution was a Section of "Permissible Medical Experiments." While it would make my appearance before you this morning too lengthy to quote this document in its entirity, it should be noted that the document contains this language:

> "The duty and responsibility for ascertaining the quality of consent rests upon each individual who initiates, directs or engages in the experiment. It is a personal duty and responsibility which may not be delegated to another with impunity."

The document begins by stating: "The voluntary consent of the human subject is absolutely essential." In the case of the Shot Kepler experiment, primarily psychological in nature, one of nine affected veterans is a resident of the State of Maine who has suffered severe physical and psychological problems as a result of this testing. Upon questioning about the special medical protocol as this writer understands it, this veteran replied to me that no such protocol was ever explained to him nor has he ever been followed medically since leaving the test site. It would be my hope that this Committee would seek legal clarification on the applicability of UN Resolution 95(I) to the use of American servicemen in radiological experimentation.

Additionally, this writer is aware of the case of three US Navy pilots who were assigned to Operation CASTLE held at Bikini Atoll in March 1954. Shot Bravo of this series, which grew to more than twice its projected yield, was detonated on March 1, 1954, and was a fission-fusion-fission device. The initial fallout from this device covered approximately seven thousand (7,000) square miles. As a result of the unforeseen spread of the fallout, three Navy pilots were ordered to fly into the cloud. According to statements made to me by a former officer present at the time, one man died the same day from radiation poisoning. The other two pilots died several days later at Tripler General Hospital in Hawaii.

Lack of time (both in person and on paper) prohibit me from giving you further examples of specific conerns, but I feel that you have more than ample evidence before you today to heavily pursue the personal health history and story of not only every CROSSROADS veteran, but of other veterans and civilian workers exposed to ionizing radiation. It's such a paradox that if a civilian is beaten, robbed, or injured, the police go first to the victim for a full accounting in great detail. If an Atomic Veteran seeks to tell his story -- it's hard because no one really asks and obtaining one's medical records usually results in great delays of paperwork; spotty or missing entries; or, in the majority of cases -- the response that medical records relating to atomic exposure were lost in a St. Louis fire. It's not unusual for a veteran seeking data on his test site participation to be told officially that he was not even there, and he must supply additional proof or at least the insistence that documents be more carefully checked again, at which time his presence is usually verified as he originally indicated.

I worry that if the Atomic Veteran is properly studied medically, the data be fairly interpreted in the light of current research findings. In a DNA Fact Sheet dated 3 April 1984, reference is made to a NTPR program which studied 39 DOD personnel exposed to over 25 rems (mostly from Shot Bravo during Operation CASTLE at Bikini in 1954). Four deceased personnel were eliminated from the study "from causes not associated with radiation (i.e., trauma, heart attacks)." The final number of personnel, after all causes of elimination, was 13 to be examined. Based on the results of eleven, the DNA Fact Sheet states (p.4):

> "No adverse health effects associated with radiation exposure received at the atmospheric nuclear tests were found during these examinations. However, one of the 13 men has since been diagnosed as suffering from leukemia."

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Portland, Maine 04101
From Now
for all time . . .
(207) 871-8668

Testimony of: Robert L. Campbell
Post Commander
Amvets Trinity Post 7-45

Think back again to that contaminated USS ATR-87, I mentioned earlier. That veteran and his commander died of very early age heart attacks. Usual comments among many veterans is not "if" but "how many" heart attacks they're up to and counting. I myself have had two early-age heart attacks and one stroke.

As a layman, I can walk into a medical library and select one of several current texts which discuss the relation between radiation and premature aging of the vascular system. For example, in the Textbook of Medicine (James Wyngaarden, MD and Lloyd Smith, Jr., MD, Vol. 1, W.B. Saunders Co., 1982) a section is devoted to "Radiation Myocarditis" in which one reads "There are many autopsy reports of patients dying in the second or third decade with extensive coronary artery disease and myocardial infarctions [heart attacks] following radiation therapy." (p.299).

It is appropriate to mention here for the record that Japan recognizes and compensates its Hiroshima/Nagasaki survivors for circulatory dysfunction as an effect of radiation exposure. I include below a list of medical illnesses allowing benefits to their survivors (most of which are denied by the U.S. to their survivors:

Anemia, Leukemia, Liver function abnormalities, except viral or serum hepatitis, Endocrine (Hormone) abnormalities, ex: Diabete mellitus; Cancer, Stroke, Brain Hemorrhage, Circulatory dysfunction, such as Hypertensive Cardiovascular Diseases, etc. Kidney dysfunction, as Chronic Nephritis, Nephrotic syndrome; Visual organ dysfunction, as Cataract (non-hereditary); Respiratory organ dysfunction, ex: lung tumor. Musculo-skeletal system abnormalities, ex: deforming arthritis. Digestive system abnormalities from ulcers, inflammation. This data was furnished to me by Kanji Kuramoto of the Committee of Atomic Bomb Survivors, per Hiroshi Terashima, M.D.

I realize this presentation has been necessarily long, but I would be remiss in my duty as Post Commander of AMVETS Trinity Post 7-45, if I did not make certain recommendations to the Committee, which are as follows:

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Testimony of: Robert L. Campbell
Post Commander
Amvets Department of Maine

-14-

1. The Atomic Veterans community thanks Senator Cranston for his work on our behalf and in particular in obtaining the GAO report on Operation CROSSROADS. We also note the good senator from California has requested that the President direct the Department of Defense to do a study of this operation. With all due respect to Senator Cranston we would have no faith in any government study of this or any other operation performed by the Department of Defense. Past performance of both the DOD as well as the VA is totally lacking in credibility. This is especially true of the VA which denied placement of an Atomic Veteran on their panel on Environmental Hazards or even observer status. In fact I personally requested copies of agenda and meeting minutes of this body and have, as of this writing, not received so much as a postcard.

It is our recommendation that Congress congressionally charter a Radiation Study Group to review the entire atmospheric nuclear weapons test program and not limit the study to any one particular test series and insure the voting participation of Atomic Veterans. I would be most happy to submit to the Committee a detailed description of my proposal if it is requested.

2. As the Committee is well aware, we are blocked from seeking judicial relief by the so-called Feres Doctrine and the Warner Amendment. We would urge Congress to enact legislation granting us the same legal rights as enjoyed by all citizens in seeking redress of just grievances. Further, as the Committee knows, the $10 fee limitation placed on what veterans may pay for legal representation as well as the lack of judicial review of VA decisions, places an unreasonable burden on the Atomic Veteran and denies him due process of law. We also urge repeal of these two provisions.

Never, in the history of this great Republic has one class of veterans who served their country so faithfully been so victimized by their government. I wonder what the Committee would be told by the Department of Defense today if they were to ask whether they have educated current active duty personnel on what their legal rights are should they be exposed to radiation and years later suffer the same fate now being endured by America's Atomic Veterans. Thank you.

Mr.Robert L. Campbell
Dept. Service Officer
Maine AMVETS
175 Lancaster Street
Portland,Maine 04101

Dear Bob; Thank you for your ltr. of 10 Oct. Sorry I left my service no. out of my application for membership, it is # . Regarding exposure to atomic radiation, I landed at Nagasaki, Japan on 23 September, 1945 as a member of Weapons Co. 6th. Marines, Second Divison. We were the first troops to occupy Japan. As such we entered the ground zero area on patrol several times. I remember the red brick dust was ankle deep, as we waded through it, the dust billowed up around us much like the dust around a car or truck on a dirt road. When out on patrol we traversed the entire drop area. On some occasions we rode in Weapons Carriers, which are open vehicles. Of course the dust could be worse during these times, due to the speed of the vehicles. Atomic dust is very light and prone to being swept by even the slightest seze. We barracked in buildings of what was left of the Mitsubishi ship yard and aircraft factory, located over a small hill at the edge of the drop zone. Most of these buildings had top floors or roofs torn off. The Seabees piped us in some water to drink and shower with. I don't have any idea about the water source, but do know it came out of Japanese pipes.

Now Bob, I was out there in the Pacific for three years so I am not going to lay my physical problems on 2 months at Nagasaki. It would not be fair to try and tie in a tropical disease, for example, to atomic exposure. As a combat Marine, I fought at Tarawa, Saipan, Tinian & Okinawa. During my tour I was on too many Islands & Island groups to mention here. Hell, there are four colonys of lepers on New Caledonia,alone. (There is also one on the island of Maui, in the Hawaiian Group) I was on both of these, but didn't contract leprosy.

My concern lies in possible genetic effects. Two of my daughters developed lymphatic cancers. One lost her thyroid at age 18. The other,her spleen at age 18. She had Hodgkin's disease, third stage and is now in a remiss stage, inactive but uncured. My daughter who had cancer of the thyroid is alive, but not alive. She is confused and disoriented most of the time.

The Marine Corps & the Veterans Administration have been very good to me. I am 100% disabled with a number of complaints, but I still consider myself a Marine. I would do it all over again, given the chance. I have noticed that not many Second Marine Division vets of my era seem to complain, perhaps they have all gone west.

Cordially Yours:

Dear Bob:

Just today I received my first contact with NARS. I had previously heard from and joined the National Association of Atomic Veterans, of whom I'm sure you are aware. I will most gladly send in my membership fee under separate cover, and am so glad to hear about NARS.

The contact that I received today was the Fall 85 issue of the publication and was delighted to see on page seven a couple of paragraphs on vets from Operation Greenhouse preparing a special meeting preceding the opening of the 1985 NARS Convention.

I regret that I cannot attend the convention. As I indicated earlier, I did not even know about it until just a few moments ago. However, I am a veteran of Operation Greenhouse and would appreciate hearing from someone else in this group, and would like to pass on to them my personal experience relative to Greenhouse.

I was activated with US Navy Patrol Sqdn. VP-931 out of NAS Willow Grove, Penna. on 5 September 1951. We we organized at Seattle, Wash. initially and then our base was changed to NAS Whidbey Island, Wash. where we made our transition flight training to P2V-2's and -3W's. In due time we were notified that we had been selected for choice duty, instead of Korea, we were going to participate in Operation Greenhouse.

In Feb. of '52 the flight crews flew to Pearl Harbor where we underwent a course in Atomic Radiation. I'm sorry, it was NAS Barbers Point, not PH.

Following our training we proceded to Kwajalein in the Marshalls, and continued training and gaining proficiency in radar search and vectoring, etc. Each of us was issued film packs and pocket dosimeters when we participated in patrols for the actual bursts. I know of no one who ever received a report on the amount of radiation we were receiving.

In any case, I participated as Radar Operator on all "bursts" which took place at Einewetok Atoll. Our mission was to keep all ships out of the area and to locate and discourage any "Foreign" subs from being able to photograph bursts, clouds, preparation, etc.

On one of the bursts, either weather briefing was off or our navigator was off, or who knows what, but our ECM Operator called the pilot and told him that his pocket dosimeter was pegged maximum. The pilot asked all crew to report. Every dosimeter in the plane, and every other radiation recording device aboard the plane recorded maximum radiation.

Our pilot reported this to Command Station and asked for relief on station. We continued to fly our pattern for another five hours before we were permitted to return to our base at Kwaj. On landing we were told to take a roll-off from the runway and evacuate the plane, which we did.

We were picked up by a weapons carrier and transported to the line where we slept in tents for the night, were fed and back in the air eight hours later, same clothes, no showers, just a fast trip through the mess hall and pick up a box lunch on the way.

Our plane on the other hand, was towed to the flight line where it was washed down for three days before the mechs could work on it.

Sixteen years later, in Sept. 1977 it was discovered during treatment for a Thrombosis in my thigh that I had a blood problem, the white blood count was 1800. This was watched every six weeks for several years with CBC's and upon the death of my Dr, and subsequent purchase of his practice by a new Dr., since there seemed to be no pattern of deterioration further in the WBC, the CBC's were suspended except for once a year. In July 1984, I was in Graduate Hospital, Phila., for a catheritization for a possible heart valve replacement, when the red light began flashing all over the place. My blood counts were all out of kilter, and in came the Hemotologists, bone marrow extracts, CBC's after CBC's.

I currently am under the watchful eye of a team of Hemotologists, keeping our fingers crossed that I will not cross the border from Borderline Leukemic to Acute Leukemic. Today's test showed the best blood counts in many months, and as a result missed another bone marrow extraction, for the time. That is now postponed until January '86, provided nothing unusual shows up before then.

Because our Squadron was augmented by regular Navy personnel, much of our crew was from regular Navy and as such we did not maintain contact after the eighteen month call-up period. In fact, except for the plane captain, who has since died of heart attack, I have lost touch with all other members of my crew. I have made inquiries in the area, but unsuccessfully. I am in touch with three other members of the squadron, one of whom is suffering from a malignant brain tumor, one who has suffered several heart attacks and one who is a raging diabetic. Four out of Four! Pretty severe average.

When I initially registered with DOD via the 800 number, the first correspondence I had from them was that they had no record of my having been in the Navy at all. Eventually they came back and verified that I had indeed been in the Navy and had participated in Operation Greenhouse.

I would most certainly like to join any others who are going to participate in possible litigation. I would therefore ask that this letter be directed to the Greenhouse group and that I be notified if there is something further that I can do to participate in any proceedings.

I thank you in advance for taking the time to read this and to pass it on. I send my kindest regards to all NARS participants. Please keep me posted.

Sincerely,

Mr. Robert Campbell
Portland Maine

Dear Mr. Campbell;

Received your letter yesterday and am answering immediately. You are truly one of the only few persons that I respect and trust. I'm certain that you spend a good deal of time for all radiation survivors. To answer your questions, my daughter is doing fine Every three months she has a spinal bone marrow tap. Regarding my own health, I don't want to bore you, suffice to say I'm much worse with pain involved. Thanks for the newspaper articles from the recent NARS convention. I might add that several months ago I was in the Long Beach V.A. Hospital (outpatient psychiatric) and was informed that all occupation forces in Japan, were there as tourists! What the hell can you expect from the V.A.??

In regards to my radiation exposure, I was in Sasebo Japan about October 1945 and then was transferred to the Submarine Tender NEREUS. We went to Nagasaki, which was closeby and tied up in the harbor. We stayed about 2 weeks. While in Nagasaki, we drank the contaminated water and bathed in it. There were 5 or 6 Jap subs tied up, and we towed them out to deep water, placed demolition crews on them, and sunk the subs (over,) I still remember, that 2 of these subs were almost twice as large as conventional subs because they could travel submerged from Japan to the Panama Canal and then launch 3 airplanes from catapults. More of these type subs were under construction.

When on liberty, as a curious 18 year old, I walked all over Nagasaki especially near the epicenter, where the Seabees had constructed an airfield right downtown. After the Seabees did their work cleaning up, a sailor on a seagoing tug told me that all of the Seabees were sick with nausea, vomiting, and unable to eat.

My own experience was that I had skin disorders while in Nagasaki Bay, and was treated aboard ship with Ultra-Violet radiation to help my skin from atomic radiation. This fact is in my Navy medical records. What is not in my medical records however, is that while in Subic Bay the Phillipines, I also had nausea and dizzy spells ~~that~~ that continue to this day. Last May for example I blacked out and I'm still suffering, because I landed on my right lower ribs. I can't sleep well because of the pain. I constantly have headaches, and every time I think how the VA has treated me, my blood pressure stays very high.

Incidentally Bob I have a 13 year old son who has frequent bloody noses, and I get upset as hell to see blood all over the house. May God give you the strength to continue for our just cause.

Dear

I was stationed at Eniwetok, South Pacific in 1950 and 1951. I was attached to the Bureau of Medicine Unit #1 APO 187.

I was on the island of Japtan raising hogs, dogs and mice to be used experimentaly in the Atomic Tests. I took part in all phases of the Test and was on the recovery team that went in and Transported and handled the animals after the Test. I was a personal driver for Col. Taylor I also was involved in disposing of the animal carcasses after autopsie. I am in possession of the Computer read-out that was sent to me by The Nuclear Defense (DNA) Agency. Immediately after the test we were rained on Twice.

On August 1951 I was sent to the States for two years shore duty. I was at Moffett Field Air Station in California for that duty time under medical observation. Within six months I started having problems with my lower legs. The flight surgeon in VR3 (Military Air Transport Squadron) told me I had hardening of the arteries and gave me medication for this condition. At that time he told me I had the legs of an eighty year old. I was 26 years old.

I've had various problems since. My skin cancer started showing up about fifteen years ago. (I've worked inside through my civilian years, not overly exposed to the outdoors) I've had numerous skin cancers cut off. The latest surgery was August 4, 1983. The process used was called MOH Chemosurgery. Several weeks later some smaller ones were burnt off.

I've had four children born since the tests. The first three were small and termed "Blue Babies"; two of which were premature and in incubators with oxygen. the first born had a heart and lung condition and wasn't expected to survive the first 24 hours. It was a mystery to the pediatrician when he did survive and there was never a diagnosis.

At about four years old he was given medication for a condition that was termed underdevelopment of the brain section that controls concentration. the other son has had numerous physical and physicological problems.

Recently since being diagnosed as having Chronic radiation dermatitis I presented my case to the Veterans Administration for reevaluation of my disability. they just turned my claim down saying it was not service connected. the information I have received so far on the different tests are quite explicit as far as data on other Atomic shots, but inconclusive when listing the shots I went through

On the fact sheet dated January 27, 1983 "Greenhouse", Jupiter was listed as a recreational Island and an Army Communication Station. I wrote to Capt. W.H. Loeffler Go Navy Nuclear Test Personnel Review, Arlington, Virginia. Correcting these statements and I have enclosed a copy of his reply to me. He also enclosed an updated fact sheet on operation "Greenhouse". Both letters, the one from Capt. Loeffler and the one from the VA turning me down arrived on the same day.

Also please note on fact sheet January 27, 1983 under Navy Greenhouse exposures, it lists Total Personnel 2,872. Where it says over 5.000 exposure there are only seven men listed. I was one of the seven. I had 5.730 exposure and was in the one percent over 5.000, but they deny my claim.

Anything your organization can do to help me with my pursuit in this will be appreciated. I am need some learned help! I will be anxiously waiting for word from your organization. This is frustrating. I'm sending membership for myself at this time and would like to add my family at a later date.

I would like to know if you have any information on the following men that were with me there:

Fredrick Knaggs
Roger D. Bartholomew
J. Hendrickson
Donald Matthews
Juneau (1st name unknown)

Also Hospitalmen: Hancock, Campbell, Gonzales, CEN Block and CHM Falziano. Some of these men went on to Bethesda and Hunters Point. The Commanding Officer was LT. Lauren J. Smith.

Sincerely,

From Now
for all time . . .

AMVETS TRINITY POST 7-45
American Veterans of World War II, Korea and Vietnam
Room 215, Government Center
175 Lancaster Street
Portland, Maine 04101

(207) 871-8668

December 7, 1985

The Hon. George J. Mitchell
The United States Senate
Washington, D. C.
20510

Dear Senator Mitchell:

I look forward to meeting with you on December 11, 1985, to discuss the recently released GAO report on Operation CROSSROADS and other areas of joint concern to Atomic Veterans. As you are aware there now exists a nationwide post of Atomic Veterans who have organized under the AMVETS banner, and have their national headquarters here in Maine. Thus the enclosed written statement, which I ask that you submit as my written testimony for the December 11th hearing being conducted, as I understand, by your colleague Senator Alan Cranston, be construed to not only represent Maine Atomic Veterans, but the now more than one hundred veterans from more than twenty states who are members of AMVETS Trinity Post 7-45.

May I also at this time commend you for the hearings you and Senator William S. Cohen recently conducted in Augusta on the problems of creating a PTSD Stress Unit at Togus. The issues which arose out of that day-long session are, I believe, indicative of the problems faced by the veterans' community at large in dealing with the Veterans' Administration. For any director of any federal facility to attempt to "muzzle" his staff when appearing before members of Congress is totally unacceptable and at the very least creates an atmosphere of mistrust between the veteran and the agency entrusted with his health care.

When you consider the problems Atomic Veterans have had with the Department of Defense in obtaining documentation of claims, the aloof attitude of the VA toward the Atomic Veteran, the lack of the veteran's ability to obtain competent legal counsel because of the $10 fee limitation, the lack of judicial review of VA claims, the planned and blatant lack of an Atomic Veteran on

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Ltr: Sen. George J. Mitchell
Page 2
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the VA Panel on Environmental Hazards, and Senator Warner's defense contractor immunity bill, it is easy to understand how the Togus Center Director can take it upon himself to alter testimony to fit over all VA philosophy which is demonstrably anti-veteran.

I commend you and your colleagues on the Senate Veterans' Affairs Committee for the work you are doing to help Atomic Veterans achieve a fair hearing before the American people and most importantly, in the halls of their government.

Very truly yours,

Robert L. Campbell
Post Commander

Encl.

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(207) 871-8668

October 31, 1985

Mr. Seymour Jablon
%Medical Follow-up Agency
National Research Council
2101 Constitution Avenue, N.W.
Washington, D. C. 20418

Dear Sir:

The purpose of this letter is to both follow up on our conversation of October 12, 1985, at Harvard University, and to bring to your attention, as well as to your colleagues, certain factual problems with assigned dose rates for Operation GREENHOUSE, as appear in the National Research Council study titled: "Mortality of Nuclear Weapons Test Participants," (hereinafter referred to as the "Study"). Additionally, I should like to bring to your attention certain facts concerning Operations CASTLE, PLUMBBOB, and CROSSROADS.

However, I should like to address my self to the further ramifications of the Study itself. First, the Study will be used by the Veterans' Administration in addressing issues raised in claims made by Atomic Veterans. Secondly, the law governing VA claims provides that there can be no judicial review of VA claims if a veteran is dissatisfied with his decision following the final step in the adjudication process. Third, the veteran is already barred from seeking other relief in the courts by reason of the so-called Feres Doctrine, which has now been linked to prohibiting suits by veterans against certain defense contractors involved in the atmospheric nuclear weapons testing program with the passage last year of the Warner Act, which was a last minute amendment added to the FY 85 Defense Appropriations Act. Fourth, the Atomic Veteran has also further had his options diminished by a U.S. Supreme Court decision which bars usage of the Federal Tort Claims Act. As a result of the foregoing, the Atomic Veteran faces a formidable array of challenges. Therefore, the consequences of your Study have far-reaching effects and in turn, it is vital that all facts be considered, and where appropriate the Study be, at a minimum, either revised or withdrawn as the facts dictate.

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As you may recall, my first concern dealt specifically with the percentage breakdown of personnel exposures (see: Table 5 in the Study) which purports that only three per cent (3.0%) of Operation GREENHOUSE participants received a dose of 5.0 roentgens or more. My statement to you was that I, as an unbadged person, residing on the residence island of Eniwetok, at Eniwetok Atoll, was assigned an exposure rate of 5.867 r gamma, which was subsequently downgraded to 4.2 r gamma, because it subsequently rained hard, at times, for four (4) days following the final shot (Item). Despite the proposed weathering thesis, which will be dealt with later in this letter, it nonetheless would be appropriate to logically conclude that none of the more than 3,000 personnel residing on the three residence islands could have received a dose less than 5.8 roentgens.

The official Defense Nuclear Agency (DNA) history of Operation GREENHOUSE [DNA 6034F], June 15, 1983, p-232-36], states, in part, "The recent analysis does confirm that all personnel living on these three islands <Eniwetok, Parry, Japtan> of Eniwetok Atoll through the entire series probably exceeded the task force's maximum permissible exposure (mpe) due to the fallout alone." The standard then in effect was 3.9 r for a 13-week period. The duration of the four-shot GREENHOUSE series all took place within an eight-week period. However, as is demonstrated in this paragraph, our exposure did, in fact, exceed the maximum permissible exposure rate. Curiously, all official records concerning this incident are absent any notice of our overexposure being given us or that official waivers, as required by the then Atomic Energy Commission (AEC), were requested. At this point the legal issue of the radiation protocol ensuing from U.S. v Brandt (NWC, Medical Case No. 1) should have at least been considered when the decision not to warn us was made by those legally responsible.

In an June 11, 1981, Jaycor memorandum from Payne Harris, M.D., to the Navy Nuclear Test Personnel Review (NTPR) unit, titled "GREENHOUSE Fallout and Dose Assessment" states, in part, in addressing the fallout created by Shot Dog (11kt), that:

"The DOG shot fallout began at about H+3 hrs. on Eniwetok, Parry and Japtan Islands...When fallout began, a meeting was held at the Rad-safe building on Parry...This group evaluated the situation and concluded the following:

"4. Usual personnel activities would continue 'ad libitum.' If a person worked inside, he stayed inside. If a person had nothing to do, he went swimming, slept or whatever.

"9. Finally, and most important there would be no disruption of 'living island' routine."

Further, this memorandum goes on to state, in part, that:

"3. Similarly residents of Eniwetok Island accumulated 40% of the Parry DOG and EASY shot fallout and 125% of the ITEM shot fallout on Parry. The accumulated dose on a full-time occupancy base is therefore 3.110R."

As previously noted above my unbadged assessment of 5.8 was downgraded to 4.2. This was done on the basis of the aforementioned memorandum by Dr. Harris, that: "On June 1, heavy rainfall again occurred reducing the fallout dose rate from ITEM shot to background values." However, this memorandum offers no substantial proof, the kind necessary to stand up under legal scrutiny, that this rainfall, in fact, created a "leaching decrease." Evidence establishing a counter-argument for either "leaching" and/or "weathering" of residual radiation created by fallout is contained in the "Enewetak Radiological Survey" [NVO-140, Vol. I-III, October 1973, United States Atomic Energy Commission, Nevada Operations Office, Las Vegas, Nevada). It is to be noted that the last tests at Eniwetok Atoll took place in 1958, and the three-volume study was done in 1973, some 14-15 years following the last detonation. Various encyclopedias establish the annual rainfall in the northern Marshall islands as being between three hundred (300) to four hundred (400) inches annually.

Therefore, it can be argued that if fourteen years of rainfall, based on the figure of three hundred (300) inches per year, could neither "leach" nor "weather" radiation left behind at this atoll that it then becomes to difficult to understand how a mere four (4) days of rain could reduce residual radiation created by Operation GREENHOUSE to background levels.

This proposition is further supported by the "Scientific Director's Report - Operation GREENHOUSE, Radiological Safety - Annex 9.3, AEC Document WT-89, James P. Cooney, Brig. Gen. MC, USA, July 1951.

First, Gen. Cooney's report contains several tables giving the fallout which actually occurred from shots Dog, George and Item. Additionally, this paper goes on to list several problems encountered with measuring equipment, such as the non-arrival on time of a valuable dust collector and pocket dosimeters, which leaked, etc. One comment (p.38) states:

> "A need for readings of beta intensities of a much higher order was found necessary..."

It should also be noted for the record that no GREENHOUSE veteran of which I am aware, has ever been notified of either his alpha or beta exposure. To date all doses have been solely in terms of gamma radiation. A thorough review of this document, especially since it contains shot-by-shot fallout contamination, would be most useful in obtaining a clearer scientific understanding of our exposure as well as monitoring equipment problems.

This citation, plus numerous others contained in the report gives rise to serious questions as to the scientific accuracy of radiation levels as well as to types of radiation. Further, no precise report is given for military and civilian construction workers residing on Engebei island, which also was used as a shot island, and it is this island which members of the October 1973 radiological evaluation team found the highest concentration of Plutonium-239, Cobalt-60, Strontium-90 and Cesium-137.

A further illustration of the problems encountered with measuring devices is contained in WT-111 (EX) Operation GREEHOUSE, Vol. II, Scientific Director's Report, Part III, Evaluation of Programs 3 to 6 and 8 - Nuclear Explosions-1951, which states, on page 7:

> "3.3 RESULTS
>
> "3.3.1 Evaluation of Ground Radiac Equipment

> "(a) Dosimeters. No dosimeter was found to be entirely adequate within the scope of field usage and the military characteristics. Although some instrument types were consistent in themselves, little intercorrelation was observed. The problems of calibration, sensitivity, accuracy, energy dependence, rate dependence, leakage, decomposition, photosensitivity, reliability and ruggedness still have not been completely solved. Dosimeters which reacted favorably in some respects failed in others..."

Thus it would follow that if these latest "state of the art" dosimeters left much to be desired, then it must be reasonably concluded that the standard dosimeter being used at that time also was inadequate. In fact one member of the USS Walker was assigned two different pocket dosimeters for Shot Dog, and five (5) times his dosimeter went off scale!

Returning to the subject of fallout at Operation GREENHOUSE, it has also been observed by the DNA in various letters and publications that the size of fallout particles were too great to be inhaled and/or ingested. However, in the document just cited, it is stated on page 5, that:

> "One rather unexpected result of the tests was an indication that a surprisingly large portion of the radioactivity might have been carried on submicron particles which were too small to be filtered out by the normal filter methods. This was first suspected when the activity collected on the filter papers failed to account for the actual ionization measured by a factor of greater than 50."

An additional point contained in your Study, page 8, states that "Ships remained in the lagoon during the detonation and fallout periods and were subjected to considerable fallout. If this is so, then it directly contradicts the "Analysis of Radiation Exposure for Shipboard Naval Personnel, Operation Greenhouse - SAI 83-874-WA July 30, 1982, which graphically illustrates that all capital ships were at pre-detonation locations well outside the lagoon. This poses the question as to which document is correct, your Study or the document just cited? This type of a situation creates serious doubt as to credibility, and when presented in the fashion of government documents and/or studies such as yours, the data, upon comparison, gives rise to the further question whether such material has been designed to be create disinformation. However, in either form, it is documents such as these upon which the Veterans' Administration places credence in determining claims submitted by Atomic Veterans.

Further disinformation also occurs in your Study where, on page seven (7) it states the approximate number of test participants in Operation GREENHOUSE as being "7,500." However, on page 26, in quoting an official source, the number of participants is given as being "9,350." Then, eleven (11) lines directly above the 9,350 figure it is stated that "7,322 military personnel..."

Also, according to your Study, it is reported (p.27) that the Study covered the time period January 1, 1952 to December 31, 1982. However, it should be noted for that record that I have reported several more deaths of GREENHOUSE personnel from various cancers and cardiovascular disorders, to the DNA during the past year. These new figures could significantly challenge the suppositions set forth in your Study, especially since your findings could easily be interpreted as official government policy in the case of Operation GREENHOUSE. It would have been more honest to add the statement: "Subsequent deaths whose causation can be linked to radiation exposure could alter these figures."

For the record, a June 4, 1985, letter from the Department of the Army (DAAG-ESG-N) to the VA Regional Office, (Togus VA Hospital), Togus, Maine, signed by Richard S. Christian, C.R.M., Director, states, in part:

> "A careful search of dosimetry data reveals no record of radiation exposure for.....The reconstructions that previously were used to provide (the veteran) with a level of radiation exposure potential are currently in the process of being reviewed. We will inform you of the results when it is completed."

In that I am the accredited Service Officer in this case, and as you are aware, am also a veteran of Operation GREENHOUSE, I contacted Dr. David Auton of the Defense Nuclear Agency to request an explanation. My question to Dr. Auton, was to the effect that, "Are you aware of a reassessment being made in the case of GREENHOUSE veterans?" His reply was in the affirmative, with the additional comment that the reassessment was being done, in part, as a result of a January 18, 1985, meeting between he and I at the DNA, as well as subsequent communications and conversations. Further, Dr. Auton informed me verbally that once the reassessment was completed he would personally inform me. As of the date of this letter no such communication has been received by this writer.

The record for Operation GREENHOUSE, for purposes of clarification should also contain, for appropriate consideration, a dying declaration made by Colonel Louis Benne, who was the officer in charge of drone aircraft at that time. Col. Benne's statement which I have submitted to the DNA, asserted that fallout from the first shot (Dog) resulted in "fallout of between 10 and 20 roentgens, with still three more shots to go." This dying declaration was submitted in accordance with Rule 804 (a),(4) and Rule 804 (b),(2), [Rules of Evidence], Federal Rules, Civil Procedure, Evidence, Appellate Procedure, U.S. Code Title 28 (Judiciary and Judicial Procedure), 1982 edition.

As concerns Operation CASTLE, I should like to add, for your consideration the actual construction of Shot Bravo (15MT). This device was, in actuality, a three-state weapon (e.g. a fission-fusion-fission bomb). The hydrogen weapon itself was, in a manner of speaking, wrapped in approximately seven thousand pounds (7,000) of Uranium. The major fallout activity was subsequently discovered as being Uranium-237, the discovery being made by Japanese scientists inspecting the fishing boat Fortunate Dragon. The question posed here for the Atomic Veteran is, can carcinogenic and/or other physical disorders brought on by exposure, which mainly consists of Uranium-237 manifest itself differently from, say, carcinogenics which occur in the bodies of civilians who have never been exposed to radiation?

Secondly, it should be noted for the record that one of the naval vessels participating in this operation was a so-called

"Jeep" carrier, the USS Barokio, which had a wooden flight deck. This becomes significant in light of the finding contained in the book "No Place To Hide," by David Bradley, MD, (a book recounting the author's experience at Operation CROSSROADS), who reported that one of the scientists with whom he worked, one Rex Huff, after conducting several decontamination experiments, concluded that the only way radiation could be extracted from wood was by planing the wood down nearly a quarter of an inch. The ramifications of this finding as regards the USS Barokio is quite apparent. This becomes all the more significant when it is noted that two ocean-going tugs assigned to Operation CROSSROADS, the ATR-40 and ATR-87, were both constructed out of wood! Further, it was later discovered that both of these vessels were sold at auction in Bremerton, Washington and that neither buyer was informed that the vessel had been contaminated. It should further be known the official Deck Logs of these two vessels clearly indicate, according to times established by the DNA in their Fact Sheet on Operation CROSSROADS, that the ATR-87 was ordered into Bikini Lagoon two hours and eleven (2:11) minutes before the lagoon was declared safe to enter and that the ATR-40 was ordered into the lagoon one hour, seventeen minutes (1:17) before the lagoon was declared safe to enter. In addition, neither the ATR-40 nor the ATR-87 were planed prior to being sold.

It should be further noted for the record that several of the ships brought back to the Washington state naval yard from Bikini, after the conclusion of Operation CROSSROADS, for decontamination, were opened for public inspection on Navy Day prior to decontamination being completed.

Turning now to Operation PLUMBBOB. In our private conversation, as well in my public question put to you on the rostrum, my primary concern was the exclusion of members of the Queen's Own Rifles of the Royal Canadian Army who participated in this operation, and more specifically, members of the 2nd Platoon, C Company, who were a part of Task Force Warrior in the Shot Smoky exercise. It seems to me that the Center for Disease Control's study on this particular shot (Smoky) is more of a political study than a scientific one, especially since it knows of the presence of these men, but excluded them for some unspecified reason. It should further be noted for the record that a Status of Forces Agreement existed at that time between the U.S. Government and that of the Government of Canada, which covers liability in joint-military operations involving two or more nations. In that the laws of science are universal it should then follow that neither nationalities nor borders where it concerns science should be taken into consideration. It should also be noted that U.S. and Canadian forces have always fought side-by-side with valor and honor, and given our common bond these men should now be included in your Study.

For the above reasons, it is my sincere hope that the National Academy of Science will withdraw its Study until such time as the questions I have raised are addressed by an independent agency with the full participation by Atomic Veterans, especially since this matter concerns not only the men who have already died, but we who also are still at risk. The Veterans' Administration, when they created the Committee on Environmental Hazards had an opportunity to include Atomic Veterans, but declined to do so saying they could not find an Atomic Veteran who was qualified, although the Public Law which mandated the creation of the panel specified that it would include an Atomic Veteran. By including our participation you will go a long way to repair the ommissions inherent in your Study.

Very truly yours,

Robert L. Campbell
Post Commander

cc: Dr. David Auton, DNA
Gov. Joseph E. Brennan
Sen. William S. Cohen
Sen. George J. Mitchell
Rep. John R. McKernan
Dr. John Gofman
Dr. Carl Johnson
Journal of the American Medical Association
Bulletin of the Atomic Scientist
Dr. James Ruttenber, CDC
Mr. Robert Alvarez
E. Cooper Brown, Esq.
AMVETS National Commander
  Robert Medarios
Dr. Donnell W. Boardman CARS
Sr. Rosalie Bertell, Ph.D
Queen's Own Rifles

NATIONAL RESEARCH COUNCIL
COMMISSION ON LIFE SCIENCES
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MEDICAL FOLLOW-UP AGENCY

OFFICE LOCATION:
JOSEPH HENRY BUILDING
21ST STREET AND
PENNSYLVANIA AVENUE, N.W.
(202) 334-2825

18 November 1985

Mr. Robert L. Campbell
Post Commander
Trinity Post 7-45
Room 215, Government Center
1715 Lancaster Street
Portland, ME 04101

Dear Mr. Campbell:

We have received and studied your letter of 31 October 1985 and we have some comments upon it. At the outset I should say that there are two distinct aspects to the problem:

1. Who was present at atmospheric tests of nuclear weapons and what were the doses of radiation to which they were exposed?

2. What has the experience of participants been subsequent to the tests and, in particular, has their mortality experience been affected in ways that might be expected as a consequence of radiation exposure?

I think you realize that our group was in no position to provide answers to question 1 above, and we concerned ourselves exclusively with attemping to answer question 2. Lists of participants who could be identified were provided to us by the individual military services and by the Defense Nuclear Agency (DNA). All information concerning individual radiation doses similarly were provided by the services, DNA or their contractors. Those estimates of dose primarily concerned external gamma radiation as measured by film badges or, sometimes, as reconstructed by methodologies that have been published by DNA. Little individual specific information is available concerning possible doses from neutrons or from internally deposited radionuclides; however, some estimates of neutron exposure to groups such as Task Force Warrior (SMOKY) have been made by Science Applications, a DNA contractor, and there have been some general remarks about ingested or inhaled radionuclides, mostly to the effect that such exposures were small. We, however, are not in a position to comment on the possible accuracy of the dosimetry information; that was not part of our responsibility.

Equally, as you know, it would not be appropriate for us to voice an opinion as to how the Veterans Administration should treat claims for injury asserted by veterans to result from exposure to radiation from nuclear weapons.

In a word, we claim no special knowledge concerning radiation doses, but rely perforce on information from the Department of Defense, and have nothing to say concerning actions by the Veterans Administration.

To take up some of your specific points:

1. Page 2 through page 5: Your dispute is not with us but with those who prepared the dose estimates for participants at GREENHOUSE. The table to which you refer is an accurate summary of the individual dose information that the Navy supplied to us. I repeat that we do not necessarily vouch for the accuracy of the information which evidently does not reflect precise measurements. However, we agree that the estimation of doses from fallout, especially to persons who were not badged, by its very nature cannot be highly accurate. I call your attention to a sentence on page 16 of our report, lines 7 and 8:

   > "In summary, the dosimetry information is inaccurate and may underestimate the true doses."

   I take it that you do not disagree with that remark.

2. Pages 5-6, paragraph: Here you dispute the statement that "ships remained in the lagoon..." etc. I call your attention to "Operation Greenhouse", DNA 6034F. On pages 196-197, the movements of Curtis are shown: this ship was in the lagoon anchored off Parry Island during all four shots. On page 102, figure 24 shows Curtis, Cabildo, LST 859 and Sgt. C.E. Mower as anchored within the lagoon off Parry and Enewetok during shot DOG. Evidently some ships were in the lagoon, others outside it. I think our statement is accurate.

3. Page 6, para 2: I don't believe that your use of the word "disinformation" is appropriate. As we have tried to make clear, we have no independent knowledge of our own concerning the number of participants at GREENHOUSE or at any other series. The military services and DNA have made different statements at different times. Of course, there is always the question of what is a "participant". USS SPROSTON, for example, was 30 nautical miles north of the DOG shot, away from the lagoon, on patrol to keep unauthorized ships away. Were the crew members "participants"? I don't think so (the ship did receive some fallout), but I don't know for sure how the Navy treated the crew members.

4. Page 6, para 3: We made clear that our study included only the time period up to the end of 1982. You appear to think it "dishonest" of us not to add that we have no information on events after 1982. I hope that, on reflection, you will agree that your point is not well made.

5. Page 8, para 3: We have no facilities for tracing members of the Canadian forces who participated at shot SMOKY. I can only assume that the CDC study excluded them for this reason, as we did. The Canadian government has a well organized and highly competent statistical office (Statistics Canada) and would be well able to study the health experience of these men should they wish to do so.

6. Page 9, last para: I must state that it seems to me that your request that we "withdraw" the study is a non-sequitur. Questions of dosimetry aside, the issue is, can one find evidence that GREENHOUSE and other test participants have, as a result of their participation, had excess risks of death from leukemia or other cancer or any other disease? The answer appears to be "No". This is not to say that cancer deaths are not occurring among the participants; of course they are. Nearly 20 percent of all deaths in the U. S. result from cancer. The question is, were there even more cases of cancer than there ought to be? We could not find evidence that there were.

Sincerely,

Seymour Jablon

Seymour Jablon
Director
Medical Follow-up Agency

SJ/er

cc: Dr. David Auton, DNA
Gov. Joseph E. Brennan
Sen. William S. Cohen
Sen. George J. Mitchell
Rep. John R. McKernan
Dr. John Gofman
Journal of the American Medical Association
Bulletin of the Atomic Scientist
Dr. James Ruttenberg, CDC
Mr. Robert Alvarez
E. Cooper Brown, Esq.
AMVETS National Commander
Robert Medarios
Dr. Donnell W. Boardman, CARS

NATIONAL COMMITTEE FOR RADIATION VICTIMS

GOVERNMENT AT THE CROSSROADS ON ATOMIC VETERANS

By

Dr. Arjun Makhijani*

Written testimony prepared for submission to the

Senate Committee on Veterans Affairs

11 December 1985

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* Dr. Arjun Makhijani and David Albright were co-authors of the May, 1983 study of Operation Crossroads in which the papers of the late Colonel Stafford L. Warren, Chief of Radiological Safety for Operation Crossroads, were for the first time publically examined. As the recently released General Accounting Office study commissioned by Senator Alan Cranston pointed out, it was this analysis of May 1983 which "challenged preliminary statements being made by the Defense Nuclear Agency (DNA) of generally low radiation doses at Operation Crossroads by offering information about the extent of contamination aboard target ships, the crude monitoring devices available, and the extent and potential dangers of inhalation of radioactive materials."

Dr. Makhijani is an Associate Professor with the Capitol Institute of Technology, Laurel, Maryland. His Ph.D. is in Controlled Nuclear Fusion from the University of California, Berkeley.

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Testimony of the National Committee for Radiation Victims, prepared and submitted by Dr. Arjun Makhijani to the Senate Veterans Affairs Committee, for inclusion as part of the record for its hearing of 11 December 1985:

We are gratified that the November 1985 report on Crossroads by the General Accounting Office has substantially borne out our 1983 conclusions. Indeed, the General Accounting Office study shows that conditions were worse than we thought when we made our analysis in 1983, both with respect to the dangers to which the men were subjected and the unreliability or non-existence of crucial radiological safety data. We have come to the conclusion that the internal and external dose estimates are scientifically and statistically meaningless when applied to specific individuals. This would be true even if the Defense Nuclear Agency amended its estimation procedures and adopted the recommendations for making better estimates made by the General Accounting Office. As they now stand, the dose reconstructions of the Defense Nuclear Agency are scientifically unsound, and consist in large measure of statistical sleight-of-hand. Let us briefly state the reasons for our conclusions with respect to the various kinds of radiation dangers faced by the personnel at Operation Crossroads.

Gamma Radiation

The following factors were among those which were not conducive to the production of a reliable record on badges, quite apart from the questions associated with the reading and interpretation of the badge data:

* the vast majority of personnel were not badged;

* those who were badged were not badged all the time;

* environmental conditions of heat and humidity were not conducive to the integrity of the badges;

* conditions on the ships were so "erratic," according to Col. Stafford Warren, that one individual could get a substantially higher dose than others merely by "hesitat(ing) on or near a high intensity radiation spot."

* the exact nature and duration of the duties could make an enormous difference, and these cannot now be known for individuals with the necessary accuracy.

* the "hairy chested" indifference to radiation dangers on the part of many officers caused them to ignore many safety guidelines and directives.

For example, those who did more work kneeling, or handled more contaminated equipment or ropes, etc. may have had much more external radiation than those who did not do such work. But it is now impossible to establish the magnitude of such variations, because there is no reliable detailed record of either the specific duration of particular individuals' activities, or of the distribution of contamination on the target ships.

Also of great importance is the question of the reliability of the badge readings. The General Accounting Office study cites tests in which laboratories were asked to read badges which had been exposed to measured amounts of radiation. In each case about one-fourth of the readings were in error by more than 100%! Several readings were in error by over 200 to 300% and the largest error was 2,000%. These errors were produced in laboratory conditions, with technically qualified people, some of whom even knew they were being tested. At Crossroads, conditions were less conducive to taking accurate readings. These facts have an enormous statistical significance for individual veterans. If a large proportion of badges have errors of more than 100%, then one must statistically conclude that the level of confidence that any particular reading is within a relatively narrow margin of error, like plus or minus 25%, will be very low. We can put this another way. In order to be reasonably sure -- 95% to 99% confidence limits are often used in statistics -- that the stated reading will not underestimate the actual dose, one would have to multiply the actual readings by several fold, even if the film was read under laboratory conditions. It would be difficult to come up with a justifiable adjustment figure for the conditions at Crossroads, where one enlisted man working under great pressure did the badge readings in crucial periods. Indeed, such was the pressure that many of the names were scribbled and are now unrecognizable. For many others only last names were recorded, so that the doses for these badges cannot now be correctly assigned to the veterans. In addition, almost all of the more than ten thousand film badges issued during the crucial period of July and August, 1946, have been lost and cannot now be rechecked.

Beta Radiation

Colonel Warren explicitly stated that beta contamination in excess of the tolerance dose was "exceedingly common." The ratio of beta to gamma radiation was high -- it averaged about 10, but went up to 100 or more in many places. The General Accounting Office report systematically discusses the underestimation or non-recording of beta radiation doses. The Defense Nuclear Agency continues to use low beta to gamma ratios and denies the seriousness of the extensive external beta irradiation which occurred at Crossroads, in spite of documented evidence to the contrary. Moreover, the film badge records show readings of zero beta radiation in the very period when Col. Warren noted it was "exceedingly common" for personnel to be subjected to doses of beta radiation above the established tolerance of 0.5 rad/day.

Internal Beta and Alpha Radiation

There was essentially no functioning, reliable equipment to measure plutonium, an alpha radiation emitter, and one of the most toxic carcinogens known. Scraping, sweeping, spraying, eating aboard target ships, and even living aboard some of them, were activities that exposed personnel to great risk of inhalation and ingestion of alpha and beta emitting radioactive materials. The men hosed down target ships with highly radioactive lagoon water, causing radioactive materials to be suspended in the air with the moisture. Where contamination of the face with beta emitters was "exceedingly common," as noted by Col. Warren on August 7, 1946, it is highly likely that many or most of these men also inhaled and ingested substantial quantities of those radioactive materials.

The contamination was so erratic that Col. Warren stated that "every contaminated place as evidenced by gamma or beta radiation on any surface of any vessel may be in fact the residue of many lethal doses of this alpha emitter." Later data analysis confirmed the unpredictable presence of substantial quantities of plutonium and of beta emitters as well. If it was impossible for the men in charge of radiological safety who were recording the data to tell who was ingesting or inhaling plutonium, how can the Defense Nuclear Agency use that data now to "reconstruct" doses and claim that the internal doses were "insignificant?"

All the available evidence points to the likelihood that large numbers of men inhaled and/or ingested substantial quantities of beta and perhaps also, alpha emitters, thus increasing significantly their chances of contracting radiogenic diseases.

Relevance For Other Test Series

The Defense Nuclear Agency has claimed that Crossroads safety precautions and film badge accuracy readings were equal to or better that those at other nuclear tests. That being the case, we should note that our foregoing comments, particularly with regard to film badges, would be valid for other tests as well, unless there happened to be extensive complimentary instrumentation to determine the dose independently of the badges. This was generally not the case. (In special circumstances such as the radioactive cloud human experiment in Operation Redwing in 1956 such data are available.) Thus, if we accept the Defense Nuclear Agency's claim that dosimetry at the various atmospheric tests was comparable, then our conclusion that the relation of the film badge readings to actual exposure is statistically tenous can be extended to all such tests.

The Defense Nuclear Agency's Dose Reconstruction

The studies of the Defense Nuclear Agency on radiation doses at Crossroads are, in large measure, a technical and statistical sham being perpetrated on atomic veterans. The Agency incorporates unrealistic assumptions which it can claim "overestimate" doses. These, in fact, are generally situations where the total dose estimates are so low that the built-in "overestimates" have little effect on the total. The Agency systematically ignores the high risk situations such as eating and living aboard target vessels, high variability in the contamination of ships, the extreme unreliability of the film badge data, etc. All of these factors point to considerably higher dose estimates. In the case of puncture wounds, the Agency did not estimate internal doses because it could find no way to do it. Of what relevance could this be to an individual contaminated in this way?

Moreover, even studies of greater integrity and technical competence than those the Defense Nuclear Agency has published can only give us a general idea about the hazards to which the men were subjected. They cannot give us reliable, statistically significant data about external and internal radiation doses received by any particular individual. The most scientifically honest answer to an individual veteran regarding dose would be: "We don't know — if you are suffering from a radiation related disease then it is quite possible that your service in the military may have caused the radiation exposure which resulted in your illness."

Conclusion

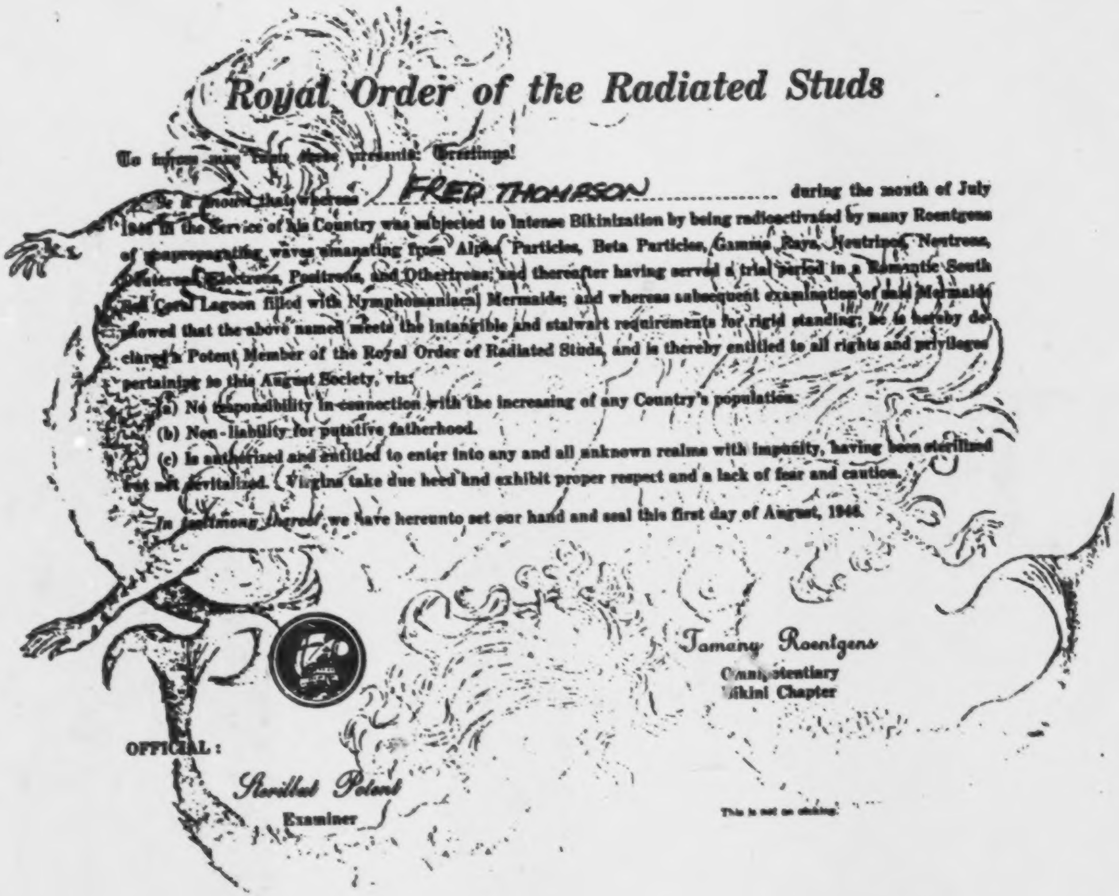
In light of the foregoing, the National Committee for Radiation Victims has two recommendations to make:

* Further studies of radiation hazards and doses resulting from nuclear testing not be conducted by the Department of Defense, the Department of Energy, or any of their contractors;

* That presumption of service connection be given to all veterans who participated in the atomic testing program from 1945 to 1963 who have radiation related diseases.

I want to thank the Committee again on my own behalf and on behalf of the National Committee for Radiation Victims, for allowing the submission of this testimony.

Arjun Makhijani



Royal Order of the Radiated Studs

To whom may come these presents: Greetings!

Be it known that whereas FRED THOMPSON .... during the month of July 1946 in the Service of his Country was subjected to Intense Bikinization by being radioactivated by many Roentgens of geopropagating waves emanating from Alpha Particles, Beta Particles, Gamma Rays, Neutrinos, Neutrons, Deuterons, Electrons, Positrons, and Othertrons; and thereafter having served a trial period in a Romantic South Sea Coral Lagoon filled with Nymphomaniacal Mermaids; and whereas subsequent examination of said Mermaids showed that the above named meets the intangible and stalwart requirements for rigid standing; he is hereby declared a Potent Member of the Royal Order of Radiated Studs, and is thereby entitled to all rights and privileges pertaining to this August Society, viz:

(a) No responsibility in connection with the increasing of any Country's population.

(b) Non-liability for putative fatherhood.

(c) Is authorized and entitled to enter into any and all unknown realms with impunity, having been sterilized but not devitalized. Virgins take due heed and exhibit proper respect and a lack of fear and caution.

In testimony thereof we have hereunto set our hand and seal this first day of August, 1946.

OFFICIAL:

Sterillat Potent
Examiner

Tamany Roentgens
Omnipotentiary
Bikini Chapter

This is not an etching.

NATIONAL ASSOCIATION OF
RADIATION SURVIVORS

1: 29

Dorothy Legarreta, Ph.D.
Administrative Director
78 El Camino Real
Berkeley, CA 94705

December 16, 1985

Senator Frank Murkowski
Chair: Veterans Affairs Committee
United States Senate
414 Russell Building
Washington, D.C.

Dear Senator Frank Murkowski,

It has come to our attention that the cover of the testimony prepared for the Senate Oversight Hearing:Part 2, held on December 11,1985, by our association has caused some confusion. The "Royal Order of Radiated Studs" award, which comprised this cover, is an ACTUAL COPY of several of these awards received by our office from Crossroads veterans over the past few years. We attached it to demonstrate the cavalier attitude on the part of those in charge of radiological safety at that series. Servicemen were actually informed they could become sterile from the radiation they would encounter, according to their personal testimony, and the transcripts of Dr. Stafford Warren's tapes, from his oral history at UCLA. and via these "awards" given at the site, 1946.

We hope this clears up any confusion this may have caused. We would appreciate you so informing other members of your Committee of this.

Thank you for your interest in this issue.

Sincerely,
Dorothy Legarreta
Dorothy Legarreta, Ph.D.

NARS Advisory Board:
Gordon Erspamer, JD
Michael Ram, JD
Ron Bakal, JD
Allan Favish, JD
Bruce de Boskey, JD
Stuart Udall, JD
Leon Gottlieb, MD
Davida Coady, MD
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Edward Martell, Ph.D.
Marion Moses, MD
N. Anthony Greenhouse, MA

NATIONAL ASSOCIATION OF
RADIATION SURVIVORS

STATEMENT OF THE NATIONAL ASSOCIATION OF RADIATION SURVIVORS TO THE HEARING ON THE GAO REPORT ON CROSSROADS ON DECEMBER 11, 1985

PRESENTED TO: SENATOR FRANK MURKOWSKI, COMMITTEE ON VETERANS AFFAIRS CHAIR
SENATOR ALAN CRANSTON, ACTING CHAIR FOR THIS HEARING

THE GAO REPORT ON CROSSROADS: A CLOSER LOOK AT DOSE RECONSTRUCTION BY DNA

Thank you for the opportunity to present written testimony before the Senate Veterans Affairs Committee on behalf of the members of NARS. In this statement, we will first consider the body of material in the GAO Report before us, noting its strengths and weaknesses from our perspective. As its scope was clearly limited by its charge from Senator Cranston, we will move beyond these explicit constraints in the balance of our testimony to report on six issues which we submit are of extreme importance in examining the subject of exposure to radiation by servicemen and women in the Nuclear Weapons Testing program. These include:

1. NARS recommendation that the DOE/DNA simply stop all dose reconstructions, by abolishing the Nuclear Test Personnel Review (NTPR); the Dose Assessment Advisory Group (DAAG); the Coordination and Information Center (CIC); the U.S.-Japan Joint Workshop for Reassessment of Atomic Bomb Radiation Dosimetry in Hiroshima and Nagaskai (RABRDHN) and all the contracts that this new industry has generated in the past decade.

2. If this proves infeasible, NARS recommends that, in place of the present system, INDIVIDUAL Dose Reconstructions be provided by the DOE/DNA for any atomic veteran requesting one, by INDEPENDENT Health Physicists.

3. Would Dose Reconstructions "improved", as the GAO urges, have any real effect on the VA's granting of compensation for radiation injury, given VA testimony here on November 14, 1985 that the adding of fourteen new compensatable cancers (VA Regs., August 26, 1985) "will not result in any substantially greater number of claims being approved for compensation." (Chief Benefits Director R. J. Vogel)[1]

4. NARS recommends that all atomic veterans filing a VA claim be compensated using the same system as that presently in effect for all POWs, i.e., presumptively.

5. NARS preliminary report on present health status of 1,054 Crossroads Veterans, nearly 40 years after exposure, will next be detailed.

6. The cost issue, which NARS will examine using the new Rand study, "Asbestos in the Courts: The Challenge of Mass Toxic Torts"[2] (December, 1985)

In reviewing the GAO Report on the Dose Reconstructions from Operation Crossroads, we find much to commend its authors. We particulary appreciated the cogent GAO Recommendations for improved personnel radiation exposure estimates, and the succinct comments in response to the multiple instances of DOD non-concurrence with these recommendations. Overall, the GAO report briefly describes a long series of inadequacies in the personnel monitoring practices utilized at Crossroads, particularly at the Baker shot. These inadequacies ranged from the reliance on measuring devices (film badges, survey meters, ionization chambers,) which were often experimental models, untried in the field, highly inaccurate except under ideal conditions, and not even built to measure the most dangerous type of radiation produced by Baker, alpha from the plutonium in the nuclear device. The GAO goes on to note that those entrusted with reading the film badges and instruments, as well as those using them as monitors on the contaminated fleet were inadequately trained, too few in number, and lacking adequate technical back-up (repair, calibration, etc.) As the numbers of serviceable measuring devices broke down by overuse in the chaotic, dangerously contaminated lagoon, the situation became a suicide mission - although one with a latency period of some 10-30 years. As Chief of Radiological Safety, Colonel Stafford Warren abruptly terminated the operation on August 10, 1946 and according to his diary for August 17, 18 and 19th, "Slept all day and night."[3]

Further eroding the database for personnel monitoring, film badges could only monitor a very narrow range, (up to 2.0 R) which was very frequently exceeded, as discovered by the few instruments capable of calibration to higher levels. But far worse is that few sailors were even badged, and not a single one for every day he served at Crossroads. What would have been required as a database for only the Baker shot, and only until its shutdown on August 10th, would have been 714,000 film badge readings (42,000 personnel times 17 days). This, of course, excludes all the myriad aspects which followed August 10, 1946, such as off-loading ammunition at Kwajalein, towing target ships to Pearl Harbor, sailing contaminated ships to the west coast for further decontamination, and so on. As a matter of fact, ONLY 2700 BADGE READINGS FROM THIS PERIOD EXIST!![4] These have been used as the database for the computer-assigned doses the DNA uses for Crossroads personnel. As another matter of fact, the ENTIRE NUMBER OF BADGE READINGS AVAILABLE FROM 1945 to 1962 IS ONLY 232,303 for some 250,000 exposed personnel![5] We do not even have to go into the continuous problems with accuracy of film badges, and their reading under even ideal conditions as late as the 1980 Nuclear Regulatory Commission study to see that there is no point in going on with dose reconstructions given such an inadequate number of individual badge readings and the inherent problems of accuracy.[6]

There are three other sources of error in the analysis of radiation contamination which are ignored or not explored in the GAO report and by the DNA. They include:

1. Neutron contamination, particularly the slow neutrons released from the detonation, which activated substances such as sodium chloride in the lagoon water. This is not addressed at all, although data exists on the beta and gamma thus produced.[7]

2. The orgy of souvenir-taking by the majority of the 42,000 sailors, including even Stafford Warren himself, as his oral history describes.[8]

    One example of many:

    > "You are more than welcome to publish my statement regarding the "raiding parties" at Crossroads. I might add that the armories were always broken into and all side-arms taken. This was quite an item of barter. These guns were shipped home after our arrival in the U.S. One case in particular was a fellow under my command who returned from a ship that was too hot to be aboard more than a few minutes with 8-45 automatics. He was told to throw them over the side, but I later found out they had been hidden and were sent to his home in Red Oak, Iowa, when we docked in San Francisco in early 1947. These were hot enough to record a full scale reading on a geiger counter.[9]

3. The constant cannibilization of equipment, as exemplified by the following excerpt:

> "Dorothy, something that did occur at Bikini that I have never seen in print is the subject of raiding parties. Commanding Officers of ships put back in service sent party after party to raid storerooms and spare part lockers from ships too HOT to place back in service.(blowing his own horn, so to speak. raising his efficiency by not ordering parts) This was did without radsafe monitors. Exposure???? anyones guess.
>
> I suggest you call or write the fellow whose address is at the bottom. He was radsafe Monitor under Dr. Warren and the raiding was quite a problem for them."[10]

To move from shortcomings in monitoring devices and readings to the inadequacy of both prior written procedures for decontamination and of their actual implemenation from Baker day forward, we note that the GAO report discusses only part of the range of deficiencies encountered. Appendix I of the report indicates that four of the nine applicable recommendations which evolved at Crossroads were never implemented. NARS submits, based on a wealth of "Personal Reports" from Crossroads participants, gathered over several years, that at least four other recommendations were also not followed:

1. A great deal of scientific equipment which was dangerously contaminated was ordered retrieved, and sailors followed these orders.[11]

2. Work continued on contaminated ships being towed or proceeding under their own power to decontamination sites such as Mare Island and Hunters Point, by shipboard personnel. Safe procedures for removing alpha contamination were not instituted for months after August 15, 1946[12] and records indicate that the alpha hazard ACTUALLY INCREASED as other contamination was removed. In fact, dangerous alpha levels remained until Geiger readings were only 1/3 of the daily tolerance of .100 Rem.[13] Further, the scuttling of over 100 contaminated small craft near Pearl Harbor was done by prisoner teams without protective clothing over a 9 month period.[14]

3. A number of target ships beyond those required for testing decontamination procedures were not sunk for as long as five years after Crossroads, and some were not sunk in deep water. One, the *Independence*, had personnel aboard until 1951, when it was finally sunk.[15]

4. The actual decontamination procedures instituted on a number of highly contaminated ships deserves an entire GAO inquiry in its own right. Sailors lived and worked aboard these ships until well into 1947. For example, on 25 April, 1947, the Roçkbridge, Rockwall, Bottineau, Fulton were finally declared decontaminated at Mare Island. Crews were on board.[16] Sand, acids, and rinsing solutions used to decontaminate many ships were dumped into San Francisco bay. Some of the sand was sold for landfill, and buyers were deliberately not told it was contaminated with plutonium. The sale of target vessels for scrap was done, although there was fear expressed that "contaminated metal may be used for purposes functionally connected with photosensitized materials".[17]

To sum up, the DNA, in its use of theoretical models for dose reconstructions based upon clearly incorrect assumptions and reliance on computer simulations based on no data or un derestimates of dose, is reprehensible. Thismust be terminated. We have all heard repeated examples of the DOE/DOD/DNA in the Nuclear Weapons Testing Program being the "Fox guarding the chicken coop". The GAO report is another instance at hand on this. Overall, then, the Crossroads dose recontruction is a travesty because:

1. Alpha contamination could not be measured, only inferred post-hoc.
2. Neutron activation was not considered or measured.
3. Beta was not measured directly,only extrapolated, and that done incorrectly.
4. Gamma was inaccurately measured, as measuring devices were rudimentary.
5. Few of the potential pathways for contamination were adequately considered.
6. So little primary data exists, no inferences as to dose can be made.

As noted in our introduction, NARS wishes to move beyond the constraints of the GAO report to consider six other topics.

First, NARS recommends that all non-individualized dose reconstructions cease. Every person who reads this testimony will recall the medieval preoccupation to determine how many angels can dance on the head of a pin. Philosophers, theologians, and the man on the street hotly debated this pseudo-issue. It became a religious litmus test, one even of orthodoxy. In this decade, 1975-85, the parallel obsession is not how many angels can dance on the head of a pin, but dose reconstruction . This obsession has spawned an immense industry of in-house agencies, universities, and other groups with highly lucrative contracts, from the DOE/DOD/DNA to develop simulations of various shots and various possible doses by various possible types of people. Just a few current examples will illustrate this point:

1. The NTPR, has, over the past eight years, spent well over $50 million on the absurd dose recontructions noted above.[18]
2. The CIC, with over 34,000 documents and a large staff, had a total of 35 visitors in one 6-month period.[19] It is part of the Nevada Test Site Public relations campaign which costs the U.S. taxpayer some $30 million annually, or $300,000,000 in the decade of the obsession with dose reconstruction.
3. The DAAG, which meets 3 times yearly and has 14 members hired to determine what doses were received by the people living downwind of the Nevada Test site. Again, it's done with computers at Lawrence Livermore, and it's all based on questionable assumptions.[20]
4. The U.S.-Japan Workshop meets yearly and has 53 participants, to consider data derived from such astounding activities as:[21]
    - a) the test-firing of an exact replica of the Hiroshima bomb at Los Alamos;[22]
    - b) An actual cluster of houses existing in Hiroshima at the time of the bomb have been reconstructed to model the effects of shielding;[23] and
    - c) Phantom models based on features of Hiroshima survivors have been constructed, using "average body features by sex and age of survivors at the time of explosion from Japanese census data for the period, using data on organ sizes and dietary factors in 1948."[24]

Incidentally, this workshop, using thermoluminescent data, found that the roof tiles 1260 meters from the hypocenter of Hiroshima had essentially the same dose received as the bricks in towns in Southwest Utah, where the Downwinders live: 26 versus 22 Rads.[25]

Second, NARS recommends that in place of the present system, INDIVIDUAL dose reconstructions be provided by the DOE/DNA/DOD to any atomic veteran requesting one, via the services of an INDPENDENT certified health physicist. The VA accepts this in its recent regulations, and the DOD/DOE/DNA need only foot the bill. As an example of what kind of dose reconstruction such a certified health physicist can do we append such a determination as well as note here the results of those done on two Crossroads veterans, now deceased.[25]

	NTPR	INDEPENDENT HEALTH PHYSICIST
Claimant 1:	.013 Rem	19.87 Rem (1500 times higher)
Claimant 2:	.2 Rem	10.44 Rem Minimum (50 times higher)

Third, will the VA, even after accepting the recommendations of the GAO report, move to grant more radiation claims than it has previously, given that its Benefits Director has stated that even after the number of compensatable disease has risen eight-fold, no greater number of radiation claims will be granted? We don't know, but given that the DNA does not accept most of the GAO report, little change is likely to occur. The present rate for Crossroads veterans is 0%; for all shots, 0.4% of claims have been granted compensation for radiation injury.

Fourth, NARS recommends that the entire Dose Reconstruction process as well as the VA claims system for atomic veterans be replaced by the identical system currently in force for our valiant Prisoners-of-War (POWs). This system grants Presumption in each case for Service-connection, and benefits are granted without undue delay. Adoption of this system would bring relief to ill and dying atomic veterans who have waited as long as forty years for justice.

To underscore this point, we want to reiterate that Canada and Japan do grant presumptive compensation and health care to their own radiation survivors. In the case of Canada, many Canadian atomic veterans were exposed along with U.S. troops at both the Nevada Test Site and Christmas Island. Finally, we wish to point out that the Marshallese are not asked to prove their exposure doses were any specific figure, or that this exposure is the cause of their illnesses. Simple justice demands that our same Government which IS compensating the Marshallese through the Compact of Free Association do as well for its own citizens.

Fifth, NARS has compiled preliminary data on the heath status of 1,054 veterans of Crossroads who sent in cards following our mailout in late September, 1985. In this, both health and genetic problems encountered by all veterans contacting the DNA toll-free number were solicited. As Fred Thompson noted, some 41,000 inquires were mailed out third-class, and using a pilot mailing of 100 sent First Class postage, we project that about 75%, or 30,000 pieces, reached some destination. Of the more than 5,000 responses received in the NARS office to date, about 20% of the population exposed was at that series in 1946. The preliminary results appear below:

CROSSROADS PERSONNEL REPORTING IN
OCTOBER & NOVEMBER 1985

	NUMBER	PERCENTAGE
Total	1,054	
Deceased	72[1]	7%
Ill	706[2]	67%
Not ill	251[3]	24%
Genetic Effects	107[4]	10%
Sterile	72	7%

---

[1] NARS believes this is an under representation, in part because only veterans were asked to respond - our error. Of the 72, 59 were from cancers, especially lung, leukemia, liver, lymphoma, brain; 9 were cardivascular; 8 were not given.

[2] Illneses included: Skin Cancer 64; Other Cancer 131; Tumors 33; Cardiovascular 124; Arthritis 104; Degenerative bone, muscle, teeth 90; Cataracts 36; miscellaneous 61(especially diabetes and respiratory non-cancer

[3] Of these, 22 did report sterility and are included in that category.

[4] These included childhood cancers 26, deformities at birth 34; mental retardation 10.

From the preceding, and the caveat that deceased Crossroads veterans are under-represented, it appears that Crossroads veterans tend to have serious health problems, most of which are not presently included on the VA list of compensatable diseases. However, as Fred Thompson noted in his oral testimony, these illnesses: tumors, Cardiovascular illnesses, Arthritis, Cataracts, Diabetes, Degenerative Bone and Muscle Disease, are considered as radiogenic by the Japanese Government, and their radiation survivors of the Hiroshima and Nagasaki bombs do receive compensation and free health care.[26] We urge our Veterans Administration to do the same.

Finally, NARS wishes to address the issue of cost, especially relevant in this era of budget constraints and the desire for a balanced budget. For this, we refer to the recently published study, Asbestos in the Courts: The Challenge of Mass Toxic Tors (Rand Corporation, Institute of Civil Justice, Santa Monica, Ca. December, 1985) - as a useful model of numbers of claims to be anticipated. An early estimate by former Director of Health, Education and Welfare (now Health and Human Services) Joseph Califano, in 1976, was that the potential number of injuries stemming from asbestos exposure would be from two to three million cases. More recently, Johns Manville, in its bankruptcy application, applied the 10% rule of thumb for toxic torts to state that the asbestos industry would be faced with an upper limit of 200,000 lawsuits by the year 2015. What has, in fact, happened is that by mid-1983, the total number of causes of action filed citing asbestos as the causation is 24,000.[27] Furthermore, the rate of filing cases is dropping. It thus appears that the total number by year 2015 would be perhaps 50,000, or 2.5% of the possible, rather than the 10% usually encountered in toxic torts. Turning to the Government estimates of 220,000 exposed personnel, it may be that the total number of claims filed would not be 22,000, but well under that figure. To date, some 3,875 VA claims have been processed for radiation injury at a nuclear site, and this may well be the bulk of those to be filed.[28] The atomic veterans are now in their early fifties to mid-sixties, with the latency period for several radiogenic cancers nearing its end. NARS believes that granting compensation for radiation injury to say, 8,000 veterans, or their widows, will be far less costly than the present unjust and Byzantine system. With a law prohibiting hiring an attorney, highly inaccurate dose reconstructions another stumbling block,and lack of judicial review, the VA has not proved itself a friend of the veteran, and a source of comfort to his widow or surviving family. We urge this committee to recommend the changes we have outlined above. Only then, we believe, will justice prevail for the atomic veteran.

Dorothy Legarreta

Dorothy Legarreta, Ph.D.
Administrative Director

FOOTNOTES

1. Testimony by V.A. Benefits Chief R. J. Vogel, before the Senate Veterans Affairs Committee on Oversight, November 14, 1985.

2. Report from the Rand Corporation's Institute of Civil Justice, Asbestos in the Courts:The Challenge of Mass Toxic Torts, December 2, 1985.

3. Diary entries from Stafford L. Warren's personal diary for August 17, 18, 19, 1946, from the Stafford Warren Collection, UCLA Library, Los Angeles, Box # 1, Folder # 1.

4. GAO Report on Operation Crossroads, November, 1985, p. 42.

5. NTPR Fact Sheet, 5 February, 1981, p. 7.

6. Nuclear Regulatory Commission (NRC) Report, University of Michigan, August 1980, found that, of 23,ooo dosimeters sent for reading to 59 processors, 90% varied above or below the actual dose. Not one processor was able to read all badges within 30% of the correct dose.

7. Neutron activation in the Bikini Lagoon was studied at the UC-Berkeley Crocker Radiation Laboratories, according to correspondence in the Ernest O. Lawrence Collection at the Bancroft Library, UC-Berkeley. Documents include: Letter, Herbert Scoville to Kenneth Scott, January 2, 1947; Letter, Joe Hamilton to Herbert Scoville, January 6, 1947; and Letter, Kenneth Scott to Herbert Scoville, January 20. 1947, which contained decay curves for neutron activation of sodium, from data calibrated from a series of gold buttons placed in the lagoon prior to shot Baker.

8. Oral History of Stafford Warren, UCLA Oral History Project, Tape Transcript, p. 984.

9. Letter to NARS from Lee Hunter, DAV Service Officer, Missouri, dated November 12, 1985.

10. Letter to NARS from Lee Hunter, October 4, 1985.

11. Personal Reports from : Dale Beaman, Roland Ford, Frank Maracek, and Jack Harris (Crossroads Veterans) in NARS files.

12. Ernest O. Lawrence Collection, Bancroft Library, UC-Berkeley: letter, Kenneth Scott to Capt. Lemmler, January 27, 1947.

13. Ernest O. Lawrence Collection, Bancroft Library, UC-Berkeley: Report: "Ships, Radiological Safety of", Admiral Lowry to Task Force1.2, September 26, 1946; Letter, Capt. Bednarczyk to Radiation Safety Advisor JTF-1.

14. Personal Report, Gregory Bond Troyer, April 3, 1978, in NARS files.

15. Time, October 18, 1948, p. 28; San Francisco Chronicle, January 15, 1982 p. 4.

16. San Bruno Archives, US Navy, Report: "Inactivation of Vessels at MINS and SFNS", Capt. W. A. Dowd, 26 April, 1947.

FOOTNOTES

17. Ernest O. Lawrence Collection, Bancroft Library, UC-Berkeley: Report, "Decontamination of Ships" Lt. Col. E. B. Kelly to Col M. D. Nichols, 28 September, 1946. It is interesting to note that this memo did not discuss any hazard to humans from contaminated metal on the scrapped contaminated ships from Crossroads being considered for sale.

18. IBID. Note 5, p. 2.

19. CIC Status Report presented to the Fourth DAAG meeting, December 2, 1981, Las Vegas, NV. not paginated. The Report also noted a total of 17 letter or telephone contacts during that same six month period.

20. Reporter's Transcripts of First Through Ninth DAAG Meetings (1979-83), USDOE, Las Vegas, NV.

21. Proceedings of the Second US-Japan Joint Workshop for Reassessment of Atomic Bomb Radiation at Hiroshima and Nagasaki, Radiation Effects Research Foundation, Hiroshima, November, 1983.

22. IBID., p. 14-21.

23. IBID. p. 67-75.

24. IBID. p. 66, 109.

25. IBIS. p. 38.

26. See Attachment I Dose Reconstruction.

27. See Attachment II: A.A Resume of Measures for Atomic Bomb Survivors in Japan, Ministry of Health and Welfare, August, 1985
B. List of Diseases Considered Radiogenic and Compensatable by the Government of Japan, in Japanese, and in translation by Hiroshi Terashima, M.D.

28. IBID. note 2.

28. Veterans Administration Table, "Radiation Exposure Claims", dated September 3, 1985.

ATTACHMENT I

RADIATION DOSE ASSESSMENT FOR DON ELLIS CORDRAY: OPERATION CROSSROADS

I

INTRODUCTION

This report details a retrospective analysis of radiation doses received by Don Ellis Cordray while assigned to the USS Fulton (AS-11) in its support of Operation Crossroads. The dose reconstruction is based upon conservative analytical models describing four exposure pathways, which were clearly operative during Mr. Cordray's tenure on board the Fulton following test Baker (25 July 1946). The pathways are external exposures from (1) accretion of radioactive material on the subsurface portions of the Fulton's hull, (2) accumulation of radioactive materials in the Fulton's evaporative desalination plant for fresh water production, and (3) accumulated radioactive material in the vessel's saltwater pipe systems during Don Cordray's assignment to perform a shipwide valve inventory. The fourth pathway is internal (inhalation) exposure from local aerosolization of small amounts of accumulated radioactive materials known to have leaked from some of the valves.

This analysis is not intended to be exhaustive (indeed, many additional credible exposure pathways can be postulated and at least qualitatively supported); nor is it mathematically rigorous beyond the level consist with the quality and paucity of the available input data. It is the opinion of this author, however, that a more comprehensive and robust analysis would most certainly result in a substantially higher estimate of Mr. Cordray's whole body and lung doses.

The following additional exposure sources or pathways were considered to be potentially significant, but were difficult to quantitate, due to insufficient information:

1. Ambient and transient exposures from the Fulton saltwater lines and heads during the entire period from 31 July to 25 September 1946. For example XRD-186, v.2, p. 19 states that the crew's head aboard the USS HENRICO was "sufficiently 'hot'" to warrant special decontamination experiments.

2. Exposures from target vessels moored along side the Fulton.

3. Internal doses from aerosols during decontamination activities on the Fulton or on nearby vessels.

4. Internal exposure from ingestion of desalination plant water containing volatile fission products, such as iodine and ruthenium radionuclides, and tritium which would have been carried over in the distillation process.

Lastly, the film badge dose estimates from the 19 persons who wore them may, in fact, be erroneously low. The available data do not contain information as to the optical densities of the "control" or "background" badges. If these films were inadequately protected from ambient radiation levels in this contaminated environment, then the standard procedure of subtracting the control film density from those of the personnel badges would have subtracted a constant amount of "legitimate dose" from all 19 personnel doses.

Test Baker was clearly an experiment which produced unexpected radioactive contamination on a grand scale. The radiological safety organization, with its veterans of yeomans service in test Able, proved to be woefully inadequate and ill-equipped for the enormous radioactive contamination problems from Baker (Wulfman, 1946; Warren, 1946). As a result, personnel dosimetry was available for only 19 of the 700 or more crew and staff members assigned to the Fulton, and this for only 27 July and 5 days between 1 and 16 August, 1946 (History, 1983; Loeffler, 1983). Yet these data were to form the bases for the official maximum dose estimates for all 700 persons regardless of their duties and activities or the lengths of their assignments following test Baker. This report and its supporting data demonstrate that significant sources of radiation existed on the Fulton for substantial periods after personnel monitoring ceased, and that some of these sources caused whole body and lung doses to Don Cordray which were well in excess of the then current radiation exposure limits.

II

METHODS

The general approach utilized in this dose assessment was to take relevant exposure rate data from Operation Crossroads literature, correct it for radioactive decay, and apply these data to Don Cordray's living and working patterns aboard the Fulton. The decay correction utilized the well-known power function, $t^{-1.25}$ (Glasstone, 1952), to establish initial exposure rates at the time periods of interest. The same power function was then integrated over the period of interest to yield the dose for that period. It was assumed that the reference monitoring data, which were usually reported in terms of Roentgens of gamma exposure per day (R/day) translate directly into rem per day whole body dose equivalent rate. The method is as follows:

Let D'_t = the measured exposure rate at some time, t (days), since test Baker;

D'_{ref} = the exposure rate D'_t corrected for decay to Baker day; and

D'_i = the initial exposure (or dose equivalent) rate for the period of interest. Then

D'_{ref} = $D'_t\ (t)^{1.25}$, and

D'_i = $D'_{ref}\ (t_i)^{-1.25}$ where t_i is the time in days from Baker day to the beginning of the period of interest.

The integrated dose, D_i, over the period of interest may be found by integrating the previous equation as follows:

$$D_i = \int_{t_1}^{t_2} D'_{ref} \cdot t^{-1.25}$$

$$= \frac{-D'_{ref}}{0.25} \left[t_2^{-0.25} - t_1^{-0.25} \right]$$

where t_1 and t_2 are respectively the first and last days of the period of interest in days since Baker day.

The aforementioned equations were used where appropriate in the following models established to describe Mr. Cordray's radiation dose experience via the pathways of interest.

A. Hull.

Colonel Stafford Warren reported on 7 August 1946 (Warren, 1946) that "As much as the equivalent of one gram of radium (1 Curie, Ci) per ton of dry weight of evaporator scale, or hull marine growth is now contained in these (support) ships. The amount increased daily in spite of the continued decrease in concentration of the lagoon water and far exceeds the loss by the decay rate." (Emphasis added.)

Monitoring results from the Fulton and other support vessels on 6 August 1946 led to the evacuation of many sleeping quarters "due to proximity to saltwater pipes or to the sides of the ship below the water line" (Morgan, 1946).

Given this background information and the situation of Don Cordray's berth adjacent to the hull near the water line, the following external exposure model was developed.

Assumptions:

1. That the hull of the Fulton became contaminated with fission and activation product radioactivity from Bikini lagoon waters by the mechanisms of cation exchange and bioaccumulation in algae and crustacea encrusted on the ship's hull at and below the water line (XRD-185, v.1, pp. 14-15).

2. That the contamination level increased linearly from the day of entry of the Fulton into Bikini lagoon (30 July 1946), and for 16 days thereafter. The benchmark for determining the accumulation rate constant was taken to be 7 August 1946, the date of Stafford Warren's commentary on the significance of this exposure pathway, and the day after K.Z. Morgan's report on evacuation of sleeping quarters. It is assumed that the average exposure rate near the interior of the Fulton's hull at and below the water line was 0.1R/day on 7 August 1946.

3. That the hull's contamination level remained constant from 16 August 1946 until the Fulton left Bikini for Kwajalein on 25 August, and declined thereafter in accordance with the standard power function, $t^{-1.25}$, where t is the time in days following test Baker. The reason for this assumption is that Stafford Warren's observed increase in the hull contamination level at a rate which "far exceeds the loss by the decay rate" could not continue indefinitely in the face of diminishing radioactivity in the lagoon water.

4. That Don Cordray spent an average of 8 hours per day in his berth near the hull at the water line until his berthing assignment was changed on 26 August, 1946; and that he spent an average of 4 hours per day at leisure activities in Submarin Stores below the water line until he left the Fulton on 25 September 1946.

This portion of Mr. Cordray's dose assessment will be approached in three separate parts: (a) the period during which the dose rate from accumulated radioactive materials on the hull was assumed to be increasing, i.e., 31 July, and 15 August, 1946, (b) the period during which the dose rate from accumulated materials on the hull was assumed to be constant, i.e., 16 August until 25 August 1946, the departure date for Kwajalein and (c) period of declining hull radioactivity from 25 August 1946 until 25 September, when Don Cordray left the ship.

(a) Given the above assumptions, the dose rate near the hull interior between 31 July and 15 August 1946 is

$$D' = \frac{0.1 \text{ rem/day}}{8 \text{ days}} \times t(\text{days}), \text{ or}$$

$$D' = 0.013 \text{ rem/day}^2 \times t$$

Since Mr. Cordray spent 1/2 day in proximity to this source, his dose rate was

$$D' = 0.013t/2 = 0.006t \text{ rem/day}$$

and his integrated dose for this period of linearly increasing dose rate is

$$D(\text{rem}) = 0.006 \int_0^t t\,dt$$
$$= 0.003t^2$$

For the 16 day period in question,

$$D_a = 0.003(16)^2 = 0.8 \text{ rem.}$$

(b) The dose rate on day 16 (15 August 1946) is

$$D' = 0.013(16) = 0.2 \text{ rem/day}$$
$$\text{or} \quad 0.1 \text{ rem/12 h}$$

and in accordance with assumption 3

$$D_b = 0.1 \text{ rem/12 hr.} \times 10 \text{ days}$$
$$= 1 \text{ rem.}$$

(c) The doses from the hull after the Fulton left Bikini lagoon may be calculated from the dose rate on the date of departure, and correcting for radioactive decay per assumption 3. The reference dose rate, D'_{ref}, is that corresponding to the initial dose rate for the period of interest, D'_i, corrected for decay back to Baker day (25 July 1946). Thus,

$$D'_{ref} = D'_i(t)^{1.25}$$

where t is the time in days since Baker to the beginning of the period of interest (25 August 1946), or 31 days.

$$D'_{ref} = (0.2 \text{ rem/day})\ 31^{1.25}$$
$$= 14.63 \text{ rem/day}$$

(It is emphasized here that D'_{ref} is not an actual dose rate to people since the Fulton was obviously not in Bikini lagoon on 25 July. It is a reference point which will be corrected for radioactive decay throughout the period of interest.)

Integrating the above equation over the period 25 August 1946 (the departure date of the Fulton, 31 days after test Baker) to 5 September 1946 (the day of Mr. Cordray's change of berth location, 42 days since Baker) gives

$$D = \frac{-D'_{ref}}{0.25} [t_2^{-0.25} - t_1^{-0.25}]$$

$$= \frac{-14.63}{0.25} [42^{-0.25} - 31^{-0.25}]$$

$$= 1.81 \text{ rem}$$

Since Don Cordray's exposure was for twelve (12) hours per day from this source,

$$D_{c1} = 1/2\ D = 0.91 \text{ rem}$$

The remaining dose for leisure time at 4 hr/day near the hull from 6 September through 25 September 1946 (19 days) is calculated similarly, as follows:

$$D = \frac{-14.63}{0.25} [62^{-0.25} - 43^{-0.25}]$$

$$= 2.00 \text{ rem}$$

Since Don Cordray's exposure was 4 hours per day during this period,

$$D_{c2} = 1/6\ D = 0.33 \text{ rem}$$

The total dose from exposure to radioactive materials on the hull is

$$D_{hull} = D_a + D_b + D_{c1} + D_{c2}$$

$$= 0.80 + 1.00 + 0.91 + 0.33 = 3.04 \text{ rem.}$$

B. Evaporator

Assumptions:

1. For the sake of simplicity, that the approximately 600,000 gallons of fresh water processed on the Fulton from 31 July to 25 August 1946 (26 days) (see FULTON's logbook)was processed at a uniform rate of 600,000/26 = 23,000 per day.

2. That lagoon water radioactive materials and certain saltwater solids accumulated in the evaporator and boiler scale. Magnesium, calcium, bicarbonate and sulfate ions are present at a concentration of 4.47 grams per kilogram of sea water (Weyl, 1970). This amounts to 0.0174 kilograms of ions per gallon x 600,000 gallons = 10,440 kilograms of ionic solids, or 11.48 tons. We will assume that 25% of these ionic solids (2.87 tons) precipitated in the desalination plant as scale, and that the rate of accumulation was 2.87 tons/26 days = 0.11 tons per day.

3. That the activity concentration was one Ci per ton of scale per Stafford Warren's report of 7 August 1946; and that this concentration was constant during the Fulton's stay in Bikini lagoon. (The concentration was probably much higher during the earlier days of the post-Baker reentry.)

4. That the accumulated evaporator radioactivity followed the $t^{-1.25}$ decay kinetics from 31 July through 25 September 1946.

5. That Don Cordray's duty station in the Ship's Service Store was located between 16 and 35 feet from the evaporator

plant, and averaged 30 feet for 10 to 12 hours per day. (Mr. Cordray was reassigned to the First Lieutenant's Department circa. 5 September 1946.)

6. That the desalination plant represented a point source of gamma radiation at 30 feet, and that 90% of the radiation was attenuated before reaching Cordray's station (leakage fraction, f = 0.1).

This portion of the assessment will be approached in two segments: (a) the exposure period from 30 July to 25 August 1946 when the activity in the evaporator was increasing during fresh water production, and (b) the exposure period from 26 August to 5 September when the activity was decreasing according to the $t^{-1.25}$ power function.

(a) Exposure period: 30 July through 25 August 1946

Rate of Accumulation =

$$0.11 \text{ T/day} \times 1 \text{ Ci/T} = 0.11 \text{ Ci/day}$$

Since the exposure rate in R/hr at 1 foot from a point gamma source,

$$D' = 6CEf$$

where C is the curie content, and E is the gamma ray energy in MeV,

$$D' = \frac{6 \times 0.11 \text{ Ci/day} \times 0.8 \text{ MeV} \times 0.1}{(30 \text{ ft})^2} \times t(\text{days})$$

$$= 5.87 \times 10^{-5} \text{ R/hr} \times t\text{, or}$$

$$= 1.41 \times 10^{-3} \text{ R/day} \times t$$

For the 26 days of this period

$$D = \int_0^{26} D' = \frac{1.41 \times 10^{-3}}{2} t^2 \Big]_0^{26} = 7.04 \times 10^{-4} (26)^2$$

$D = 0.48$ rem for 24 hr/day exposure, or

$D = 0.24$ rem for 12 hr/day exposure.

(b) Exposure period: 26 August through 5 September 1946. The activity in curies on 26 August, $C_{8/26/46} = 2.87$ Ci

$C_{ref} = 2.87(32)^{1.25} = 218.4$ Ci

$D'_{ref} = 6 \times 218.4 \times 0.8 \times 0.1/30^2$

$= 0.12$ R/hr at 30 ft or 2.8 R/day at 30 ft

$D = -2.8/0.25\ [42^{-0.25} - 32^{-0.25}]$

$= 0.31$ rem for 24 hr days, or 0.15 rem for 12 hr/day exposure.

Therefore, $D_{evap} = D_a + D_b$

$= 0.24 + 0.15$

$= 0.39$ rem

C. Valve Inventory (External Dose)

Data:

The following monitoring data were taken in September and October 1946 from saltwater valves and piping from other support vessels which spent similar amounts of time (or less) in Bikini lagoon, as did the Fulton (XRD 186, v. 1 and 2):

Vessel	Location	Average Exposure Rate R/day, gamma)	XRD Source
USS LAFFEY & USS BOTTINEAU	Cu-Ni and Fe Plumbing (2 readings)	0.04	V.1, p.38
USS BENEVOLENCE	16" Fe Cross-over line (12 readings)	0.27	V.2, p.62
USS ROCKBRIDGE	Fire and Sanitary plumbing systems (30 readings)	0.51	V.2, pp. 102-103
Overall Average (n=44)		0.42	

In addition, measurements of decontaminated saltwater piping for the USS Fulton taken at Mare Island between 11 and 14 December 1946 indicated an average of 0.006 R/Day for seven locations. (Buships, 1946)

Assumptions:

1. That the average point in time for the first series of measurements above was 25 September 1946 (62 days post Baker); and that the corresponding point for the Fulton's measurements was 12 December 1946 (140 days post Baker).

2. That the decontamination of factor (F) for removal of radioactivity from the aforementioned Fulton saltwater piping was 10. This is a conservative assumption based on a review of the Crossroads literature, where decontamination factors ranged from 1 to 250+. (In situations where no activity was detected after decontamination, the decon factor is effectively infinite!)

The following examples are cited from the literature where exposure rate readings were taken before and after decontamination:

(a) U.S.S. HENRICO, firemain plumbing -- calculated values of F ranged from 3 to 100+, and averaged 29 (XRD-186, V.2, pp. 46-47, 1946).

(b) U.S.S. LAFFEY, Cu/Ni and steel plumbing -- F ranged from 3.3 to 50+, and averaged 20 (XRD-186, V.2, p. 135, 1946).

(c) U.S.S. BENEVOLENCE, 16" crossover main -- calculated value of F from the averaged of multiple readings before and after decontamination was 12.3 (XRD-186, V.2, pp. 62-63, 1946).

3. That the overall average dose rate from the Fulton's saltwater plumbing was the average of the above data corrected for decay to the valve inventory period: 5 September 1946 (42 days post Baker) to 2 October 1946 (69 days post Baker).

4. That Don Cordray participated in the valve inventory throughout the aforementioned period, and that he spent 9 to 10 hours per day at this task, 8 hours of which were spent in close proximity to contaminated saltwater piping and valves; also, that the first two days of the inventory was spent in and around the desalination plant at an average distance of 6 feet from the evaporators or boilers.

This assessment will be separated into two parts (a) the dose contribution from the valves themselves and (b) the dose contribution from the desalination plant.

(a) Total external dose from valves and pipes. The reference dose rate, D'_{ref1}, for the Fulton is

$$D'_{ref\ 1} = 0.006\ (F)(t)^{1.25}$$
$$= 0.006\ (10)(140)^{1.25}$$
$$= 28.9\ \text{R/day},\ (n = 6)$$

and for the other vessels

$$D'_{ref\ 2} = 0.42\ (62)^{1.25}$$
$$= 73.1\ \text{R/day},\ (n = 44)$$

The appropriately weighted average of these two values gives

$$D'_{ref} = 67.8\ \text{R/day},\ (n = 50)$$

and the integrated dose for the period 5 to 20 September 1946 is

$$D = \frac{-67.8}{0.25}\ [69^{-0.25} - 42^{-0.25}]$$

= 12.43 rem for 24 hr/day exposure, or

= 4.14 rem for 8 hr/day exposure.

(b) Evaporator dose during valve inventory:

$$C_{9/5/46} = C_{ref}\ (42)^{-1.25}$$
$$= 218.4\ (42)^{-1.25}$$
$$= 2.0\ \text{Ci}$$

$$D'_{9/5/46} = 6 \times 2.0 \times 0.8 \times 0.1/6^2$$
$$= 0.027\ \text{R/hr at 6 feet.}$$

For the two inventory days in the vicinity of the evaporator,

$$D_b = 0.027 \text{ R/hr} \times 16 \text{ hr}$$
$$= 0.43 \text{ rem}$$

Therefore,

$$D_{\text{valve ext.}} = 4.14 + 0.43$$
$$= 4.57 \text{ rem}$$

D. Valve Inventory (Internal Dose)

Assumptions:

1. That some percentage of the Fulton's saltwater valves leaked, and that 1% of the accumulated radioactive contents dripped onto the floor or other nearby surfaces, and evaporated to dryness.

2. That this material was aerosolized by local activity during the valve inventory and was evenly distributed into 1 cubic meter of air.

3. That the residence time for Mr. Cordray in this area was 5 minutes, and his average respiration rate was 20 liters per minute for a total respired air volume of 100 liters, or 0.1 cubic meter.

4. That the valve attenuated 50% of the gamma rays (average energy = 0.8 MeV) from the accumulated radioactive material inside, and that the average exposure rates of 0.33 R/day on 25 September 1946 and 0.065 R/day on 12 December 1946 were measured at 1 foot from the valves.

Given D'_{ref} from section C, part a at 67.8 R/day, the dose rate from an average valve on 5 September 1946 is

$$D' = 67.8(42)^{-1.25}$$
$$= 0.63 \text{ R/day;}$$

and the unattenuated exposure rate from the valve contents is

$$2 \times 0.63 = 1.27 \text{ R/day or}$$
$$1.27/24 = 0.053 \text{ R/hr at 1 foot.}$$

Since the exposure rate at 1 foot can be estimated from the curie content by use of the formula

$$D' = 6CE$$

then, conversely, the activity content can be estimated by rearranging this equation:

$$C = D'/6E$$
$$= 0.053/6(0.8)$$
$$= 0.011 \text{ Ci or } 11 \text{ mCi}$$

Of this total, according to the exposure model used, 110 μCi leaked out of the valve and became aerosolized, and 11 μCi was inhaled.

Crossroads document X000083 (Scott, 1946) reported a constant ratio of 0.0013 μg plutonium per μCi fission products on 6 September 1946. Therefore

$$11 \times 0.0013 = 0.0143\ \mu\text{g Pu} \times 1\ \mu\text{Ci}/16\ \mu\text{g} = 0.0001\ \mu\text{Ci Pu}$$

was also inhaled.

According to the International Commission on Radiological Protection (ICRP, 1966; Snyder, 1966) the dose to the tracheo-bronchial (T-B) region of the respiratory tract is divided into two increments: (a) the dose from the initial deposition of radioactive materials in the T-B region, D_i, and (b) the transit dose, D_t, from material initially deposited in the pulmonary region while being cleared through the T-B region. These doses may be estimated directly from Figure 3 in the ICRP report as follows:

(a) fission products --

$D_i = 10^{-4}$ rem/MeV/dis/ Ci x 1.0 MeV x 11 Ci = 1.1×10^{-3} rem

plutonium --

$D_i = 10^{-4}$ x 53 MeV x 0.001 Ci = 5.3×10^{-6} rem

D_i total = 1.11×10^{-3} rem

(b) fission products --

$D_t = 10^{-3}$ rem/MeV/dis/ Ci x 1.0 MeV x 11 Ci = 1.1×10^{-2} rem

plutonium --

$D_t = 10^{-3}$ x 53 MeV x 0.001 Ci = 5.3×10^{-5} rem

D_t total = 1.11×10^{-2} rem

The total dose to the T-B region is therefore the sum of the above, or 1.22×10^{-2} rem per valve.

If we assume that 10% of the valves leaked such that this scenario is repeated for 200 of an estimated 2000 saltwater valves, then

$D_{\text{valve int.}}$ = 2.44 rem.

E. Total Dose

The total dose from the four pathways analyzed is

$$\begin{aligned} D_{total} &= D_{hull} + D_{evap} + D_{valve\ ext.} + D_{valve\ int.} \\ &= 3.04 + 0.39 + 4.57 + 2.44 \\ &= 10.44\ \text{rem} \end{aligned}$$

III

DISCUSSION AND CONCLUSIONS

This assessment has been handicapped throughout for the lack of adequate radiation monitoring data on the Fulton itself. The Operation Crossroads documentation and Don Cordray's Declaration contain notations as to the magnitude of the contamination and radiation control problems on board the Fulton; for example, the need to dump ship's scullery and tools overboard, and the sinking of several of the Fulton's small boats (Cordray, 1983). It is highly likely that abundant monitoring data from the Fulton are included in the decontamination reports from Mare Island or Hunters Point. However, these reports have not been located to date. As a result, this assessment has relied largely upon monitoring data from other support vessels with similar experiences at Bikini following Baker, and upon plausible inferences from the qualitative and quantitative comments of the radiological safety section staff. Therefore, this assessment has per force been incomplete.

In spite of these limitations, the doses that Mr. Cordray probably received from the sources identified in this report are still well in excess of the "tolerance" dose limit of 0.1 rem per day during his assignment period on the Fulton following test Baker.

It should be noted also, that the concept of "tolerance" was borrowed from the toxicologist's lexicon wherein apparent thresholds exist for acute toxic effects from chemicals. Thresholds had been observed for acute radiation effects, such as skin erythema; and the tolerance dose of 0.1 R/day used by the military during operation Crossroads was derived from the estimate of 1/100 erythema dose circa. 1932 (Taylor, 1971). Observations of the carcinogenic and leukemogenic properties of ionizing radiation became apparent after several decades of latency in early radiation workers. Thus, as with many other environmental insults, the standards for safe exposure have become progressively more conservative as experience and scientific knowledge have grown.

Today the radiation protection community regards the oncogenic risk from radiation exposure as its greatest hazard, and it prudently assumes no threshold. The present occupational dose limit of 5 rems per year (ICRP-1977) was derived from an "acceptable level" of risk. This is a factor of five lower than the limit during the Crossroads era. This 5 rem/year limit also carries with it two caveats: (1) that occupational doses be kept as low as is reasonably achievable within the 5 rem/year ceiling; and (2) that the dose should be spread out as uniformly as possible over the year.

This author concludes that the combined whole body and tracheo-bronchial dose received by Don Cordray during his tenure of two months on the Fulton following test Baker was at least 10.44 rem.

The U.S. Department of Energy (DOE), successor to the Atomic Energy Commission, would consider this a "Type B Incident" (whole body radiation dose in excess of 5 rem within one calendar quarter). In such a case, Department regulations require notification of DOE Headquarters within 72 hours, and the establishment of a DOE-appointed investigation committee to ascertain causes and recommend preventative measures. The committee report is filed with appropriate DOE field offices and with Headquarters in Washington, D.C.

A similar incident within the Navy system requires notification of Nav-C Headquarters within 24 hours, and the establishment of a 6-person investigation and critique panel which also reports to Washington.

N. Anthony Greenhouse
Certified Health Physicist
November 22, 1983

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DECLARATION OF DON ELLIS CORDRAY

1. I was born on July 31, 1927, in New Boston, Missouri.

2. On October 2, 1945, I enlisted in the United States Navy. I was 18 years old. I served in the Navy for 19 of the next 21 years. I closed my Navy career in 1966 with an Honorable Discharge.

3. In late 1945 I received my Basic Training in San Diego, California. In early 1946 I was transferred to the USS FULTON (AS-11). Shortly afterwards the FULTON became underway for Pearl Harbor and the South Pacific.

4. I have examined three of the FULTON's ship's plans, entitled "INBOARD PROFILE", "2ND DECK", and "1ST PLATFORM" (the "Ship's Plans"). The Ship's Plans are attached hereto and incorporated herein by reference. I have examined the Ship's Plans in detail. The FULTON's layout as depicted in the Ship's Plans is substantially identical to the layout of FULTON when I was stationed aboard her in 1946. I have made notations of the areas where I worked, lived, and slept. I have also made notations of areas where memorable events and incidents took place. At various places on the Ship's Plans, Mr. Bruce Lymburn, my attorney, upon my instructions wrote down recollections of places and events. I have initialed where Mr. Lymburn wrote down these recollections.

5. In the early Spring of 1946 the FULTON left Pearl Harbor for Operation Crossroads at Bikini Atoll in the Marshall Islands. To the best of my knowledge the FULTON's role at that Operation was to (1) provide general supply and repair services to the approximately 100 support vessels at Bikini, and (2) provide supply and repair services to target submarines following the atomic blasts.

6. Shortly after I reported for duty aboard the FULTON, I was assigned to the ship's Bureau of Supply and Accounts. I was further assigned to "GSK": General Storekeeping. I remained a part of the Navy's supply operation for the duration of my Navy career.

7. My initial duty station aboard the FULTON was "Main GSK," located on the Third Deck. Storekeeping records were kept in Main GSK.

8. At some time before July 1, 1946 my main duty station was changed from Main GSK to Ship's Service Store, located on the Second Deck.

9. I had three main duties as a Seaman assigned to GSK: (1) I obtained supplies from various store rooms on the FULTON; (2) I notified ships -- mainly submarines -- moored alongside the FULTON that supplies were ready to be picked up; and (3) I stood routine watches.

10. GSK typically operated as follows: Someone -- often from a ship nested alongside -- would bring a "chit" to GSK

for processing. The chit would request particular supplies or parts. The chit paperwork would be processed, and someone (often myself) would go to one of the FULTON's many store rooms and get the particular supply or part. If a ship alongside expressed some urgency about obtaining parts or supplies (that is, an "A" chit was presented) someone from the FULTON (again often myself) would go to the ship alongside with the part or supply, or with a notification that the part or supply was ready to be picked up at GSK.

11. My typical day while stationed at Ship's Service Store was spent as follows: I worked about 8-10 hours per shift. Most of this time was spent obtaining parts and supplies from various storerooms. When not engaged in these tasks I spent time at my main duty station. About every other night I would stand watch (the port side alternated with the starboard side for watch duties).

12. The FULTON's store rooms were found all over the ship, but were primarily located in the lower decks, below the waterline where the temperature was cooler and less variable.

13. Until my transfer to the First Lieutenant's Department on or about September 5, 1946, my sleeping quarters were located on the FULTON's Second Deck, in the aft Crew's Berthing area, right next to the hull, on a bottom bunk. I remember that I could hear water outside the hull. I also remember being cooled because I was next to a blower mounted on the inside of the hull.

Occasionally I slept on a cot in lower storerooms where there was less light and noise.

14. I often spent my recreational time playing "Acey-Deucey" or poker with the Seamen in Submarine Stores, located on the First Platform.

15. On the morning of July 1, 1946, I was ordered to the Boat Deck. I was with 18 other sailors. We were issued radiation badges and sunglasses. We were lined up in two rows, and were told to put our heads down. Test Able was then detonated. To the best of my knowledge, during this detonation we were the only persons on the FULTON not inside the ship. After the test, I resumed my regular GSK duties and activities.

16. In the days and weeks following Test Baker, the underwater detonation, I performed all of my regular GSK duties. Occasionally I went aboard target submarines alongside to notify submarine personnel that supplies were ready.

17. While underway from Bikini to Kwajalein Atoll, I was ordered to throw overboard significant amounts of officer's scullery stored on the ship. Soon after that was accomplished, I was ordered to throw overboard various tools and equipment not necessary to enable the ship to reach Pearl Harbor. My inquiry about the reason for these orders went unanswered.

18. On September 1, 1946, I was assigned to general mess duties. I remained a General Messman until around the time the FULTON reached Pearl Harbor.

19. On or about September 5, 1946, while the FULTON was approaching Pearl Harbor, I was temporarily assigned to the ship's First Lieutenant's Department. At this time my sleeping quarters were changed to the forward Crew's Berthing area on the Second Deck. My duties in the First Lieutenant's Department lasted for the duration of my remaining time aboard the FULTON. My duties consisted of conducting an extensive survey and inventory of all of the valves on the FULTON. As can be imagined on a ship the size of the FULTON, this inventory took many, many days. Each valve, of whatever type, had to be found, its exact location noted, the precise type of valve described, etc. This task involved each and every valve on the ship, including the extensive valve and pipe system in the ship's evaporator room, and the salt water systems in all of the heads. Each day I worked long hours -- up to 12 hours per day -- at this task. In addition to our regular hours, we often worked at this task for a few hours after our evening meal.

20. During the valve survey, I worked with a Shipfitter First Class. He had black, thinning hair, wore glasses, was about 6'1", and weighed about 180 pounds; I don't remember his name. He and I conducted the survey together. He would call out the valve type, size, and other information, and I would write the information down on special forms I carried with my clipboard.

21. Many salt water and fresh water valves leaked. Some leaked only a few drops, some were close to a steady stream.

Some floor areas were wet, to the extent that our shoes and trousers became wet from splashing.

22. In some instances, due to the awkward location of a valve, we were forced to stoop or lie prone beneath a pipe or valve in order to ascertain the information needed.

23. When the FULTON arrived at San Francisco Bay to undergo decontamination, the crew was ordered to sleep in barracks ashore. We reported for duty aboard the ship during the day, but slept in barracks at night. During this time most of the crew was discharged or transferred.

24. While the FULTON was moored at San Francisco Bay, I was present in the crew's head when radiological monitors entered with equipment that appeared to be Geiger Counters. This equipment emitted loud rapid staccato popping noises when held in proximity to the toilets.

25. I was transferred from the FULTON on October 10, 1946. I was one of the last crewmen transferred from the ship.

26. In the years since Operation Crossroads, neither the Navy nor any other governmental organization ever warned me that I had been exposed to radiation, that I was in danger of contracting radiation-related illnesses, or that I should report to a physician periodically for examination to discover radiation-related illnesses.

27. In 1976 I was diagnosed as having a bronchial carcinoma.

I declare under penalty of perjury that the foregoing is true and correct.

Date: 2 Nov. 1983 Don Ellis Cordray

Don Ellis Cordray

STATE OF CALIFORNIA

COUNTY OF CONTRA COSTA, SS.

On this 2nd day of November, 1983, before me, a Notary Public, State of California, duly commissioned and sworn, personally appeared DON ELLIS CORDRAY, known to me to be the person who executed the within instrument.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal as of the date first hereinabove written.

DIANE E. POTTS
My Commission Expires October 25, 1985

Diane E. Potts
Notary Public Diane E. Potts

My commission expires: October 25, 1985

ATTACHMENT II A

A RESUME OF MEASURES FOR ATOMIC BOMB SURVIVORS IN JAPAN

Ministry of Health and Welfare

August 1985

The Atomic Bomb Survivors Medical Treatment Law and subsequently the Atomic Bomb Survivors Special Measures Law were enacted in 1957 and 1963, respectively, for the purpose of promoting medical care and welfare measures for atomic bomb survivors exposed in Hiroshima and Nagasaki.

I. Atomic bomb survivors as defined by the law of 1957 are provided health handbooks. The number of these handbook holders as of 31 March 1985 is 367,344. These handbooks are issued by prefectural governors and the mayors of Hiroshima City and Nagasaki City upon application by atomic bomb survivors who conform to any of the following:

1. A person who at the time of the atomic bomb detonation was directly exposed within Hiroshima City or Nagasaki City or within a specified adjacent area of these cities or a person who at the time was in utero of a mother under the foregoing situation.

2. A person who entered within two weeks after the atomic bomb detonation a zone about two kilometers from the hypocenter of the atomic bomb or a person who at the time was in utero of a mother under the foregoing situation.

3. A person who engaged in relief of atomic bomb survivors or other activities to be physically affected by radiation or a person who at the time was in utero of a mother in the foregoing situation.

II. At present, the Japanese Government provides to health handbook holders the following medical care, allowances, and welfare measures. Funds are also provided for research and investigation related to atomic bomb survivors. The total budgetary outlay in the fiscal year (FY) of 1985, that is, from April 1985 to March 1986, is 429.0 million dollars computed at an exchange rate of 240 yen to one US dollar.

A. The budget for medical care to be provided this year in accordance with the Atomic Bomb Survivors Medical Treatment Law is 88.4 million dollars which is allocated as follows:

1. $500,000 for medical treatment of designated diseases. Cost of medical care involved in treatment of diseases attributable to atomic bomb radiation is borne in its entirety by the Government.

2. $81,600,000 for medical treatment of diseases in general. For treatment of diseases other than designated diseases, the Government bears that portion of the expenses not covered by health insurance. Consequently, atomic bomb survivors need not bear any expense involved in treatment of diseases in general.

3. $6,300,000 for health examination of atomic bomb survivors. Health examinations are available four times a year, i.e. regular examinations are provided twice a year and in addition two examinations are available at request.

B. In accordance with the Atomic Bomb Survivors Special Measures Law, various allowances as described below are provided to atomic bomb survivors with the amount for this fiscal year totalling 327.0 million dollars.

1. Special Medical Care Allowance: $450 per month will be payable to survivors who are suffering from diseases or injuries designated by the Minister of Health and Welfare to be attributable to atomic bomb radiation (2,014 cases in FY 1984).

2. Special Allowance: $166 per month will be payable to survivors who have been cured of their diseases or injuries designated by the Minister of Health and Welfare to be attributable to atomic bomb radiation (1,762 cases in FY 1984).

3. Atomic Bomb Microcephaly Allowance: $155 per month will be payable to survivors who have microcephaly due to atomic bomb radiation (24 cases in FY 1984).

4. Health Management Allowance: $110 per month will be payable to survivors who have any of eleven types of disorders including circulatory disturbances such as hypertensive heart disease, motor disturbances, visual disturbances such as cataract, hematopoietic disturbances, liver function disturbances, and endocrine disturbances (216,538 cases in FY 1984).

5. Health Allowance: $55 per month will be payable to survivors who were directly exposed within two kilometers from the hypocenter and those who at the time were in utero of mothers in the foregoing situation (25,788 cases in FY 1984).

Health Allowance: $110 per month will be payable to survivors of the foregoing category who are either physically handicapped of the 1st to 3rd grade as defined in the Physically Handicapped Persons Welfare Law or suffering with keloids or living alone without any kin and 70 years of age or more (2,096 cases in FY 1984).

6. Nursing Aid Allowance: $152 per month will be payable to survivors having mental or physical disturbances requiring the employment of a person for nursing aid (5,413 cases in FY 1984).

7. Family Aid Allowance: $47 per month will be payable to survivors having severe disturbances requiring the assistance of a non-paid person (21,733 cases in FY 1984).

8. Funeral Allowance: When an atomic bomb survivor dies, $471 will be payable to the person who holds the funeral (5,808 cases in FY 1984).

The Special Allowance, Health Management Allowance, Health Allowance, Nursing Aid Allowance, and Family Aid Allowance are not payable to those having a family member paying an annual income tax exceeding $3,382 or when the annual income of a family with two children and with one working parent exceeds $35,247.

C. As welfare measures, a total of 4.9 million dollars is made available as subsidies for the following:

1. Atomic Bomb Hospitals and Homes for Atomic Bomb Survivors
2. Home helper and consultation services for atomic bomb survivors
3. Atomic Bomb Memorial Ceremonies

D. For research and investigation of atomic bomb survivors, a budget of 8.7 million dollars is provided for the following:

1. Research program of Radiation Effects Research Foundation
2. Research and investigation of atomic bomb diseases
3. Survey on present status of atomic bomb survivors

ATTACHMENT II B

HIROSHI TERASHIMA, M.D.
INTERNAL MEDICINE
Diplomate American Board of Internal Medicine

411 - 30th Street, Suite [illegible]
Oakland, California 94609
(415) 835-2744

October 22, 1984

Mr. Kenji Kuramoto
1109 Shell Gate Place
Alameda, California 94501

Dear Mr. Kuramoto:

The following medical illnesses are equivalent to what is listed as medical illnesses qualifying for government benefit for atomic bomb survivors: (Japan)

1. Anemia. Leukemia
2. Liver Function abnormalities (except viral or serum hepatitis
3. Cancer
4. Endocrine (hormone) abnormalities
   Example: Diabetes mellitus
5. Stroke, brain hemorrhage
6. Circulatory organ dysfunction
   Example: Hypertensive cardiovascular diseases, etc.
7. Kidney dysfunction
   Example: Chronic nephritis, nephrotic syndrome
8. Visual organ dysfunction
   Example: Cataract (except hereditary type)
9. Respiratory organ dysfunction
   Example: Lung tumor
10. Musculoskeletal system abnormalities
    Example: Deforming arthritis
11. Digestive system abnormalities from ulcer/inflammation
    Example: Stomach ulcer

Sincerely,

H. Terashima
Hiroshi Terashima, M.D.

HT:w

原爆被爆者に対する援護のお知らせ（見やすい所にお貼り下さい）

被爆者の諸手当が、次のように改正されます。

手当の種別	支給金額	病気の種類	支給条件	所得税額による制限
医療特別手当	月額　104,400円	原爆の傷害作用によるものと厚生大臣の認定をうけた者（認定患者）で、現在もその負傷または疾病の状態にある人	認定被爆者	な　し
特別手当	月額　38,400円	厚生大臣の認定をうけた人で現在はその負傷または疾病の状態にない人（固定した人）		年間所得税額が 792,300円以下の人
健康管理手当	月額　25,600円	1．造血機能障害（貧血症・白血病など） 2．肝臓機能障害（血清肝炎・ビールス性肝炎を除く） 3．細胞増殖機能障害（悪性新生物など） 4．内分泌腺機能障害（糖尿病など） 5．脳血管障害（脳出血など） 6．循環器機能障害（高血圧性心疾患・慢性虚血性心疾患など） 7．腎臓機能障害（慢性腎炎・ネフローゼなど） 8．視機能障害（白内障）先天性を除く 9．呼吸器機能障害（肺気腫など） 10．運動器機能障害（変形性関節症など） 11．潰瘍による消化器機能障害（胃潰瘍など）	左の病気のある人	同一世帯のうち直系血族の一人の年間所得税額が 792,300円以下の人
保健手当	月額　12,800円	制限なし	2kmの以内で直接被爆した者（医療特別・特別・健管手当との併給はできない）	上に同じ
	月額　25,600円	70才以上の孤老，厚生大臣が定める程度の身体上の障害・ケロイドのある人		
介護手当	月　35,800円以内	厚生大臣が定める障害等のため，医師が介護の必要を認め，介護料を支払っている人	介護日数より	上に同じ
家族介護手当	月額　10,800円	厚生大臣が定める障害等のため，医師が介護の必要を認め，家族介護をうけている人	制限なし	
葬祭料	一時金105,000円	被爆者が死亡した場合	交通事故・喧嘩などで死亡した場合は除く	な　し
小頭症患者	月額　35,800円		小頭症と認定された人	な　し

◎左記の表の金額は昭和五十九年六月分から支給されます。所得制限は昭和五十九年六月分から実施（五月中に税額届を提出して下さい。）

◎諸手当申請手続、その他被爆者の相談ごとは ⇩

広島市中区大手町四丁目五番六号
（財団法人）原爆被害者福祉センター

◎の利用申込は⇩

●舟入病院（人間ドック）
●別府原爆センター
●[illegible]荘
●山口市湯田苑
●長崎（大和荘）
●宮浜[illegible]もりもと旅館

広島平和会館
電話 〇八二－二四一－七二二六番

Sept. 3, 1985

RADIATION EXPOSURE CLAIMS

		NUMBER	PERCENT
A.	Total Number of Cases in Study	5194	100.0%
	Cases with Diagnosis	3083	59.4%
	Cases no Diagnosis	2111	40.6%
B.	Cases with Diagnosis	3083	100.0%
	Allowed	79	2.6%
	Denied	3004	97.4%
C.	Total Cases in Study	5194	100.0%
	Claimed A-Test	3050	58.7%
	Claimed Other Exposure	2144	41.3%
D.	Those Who Claimed A-Test	3050	100.0%
*	Allowed	15	0.5%
	Denied	1871*	61.3%
	No Diagnosis	1164	38.2%
E.	Those Who Claimed Other Exposure	2144**	100.0%
	Allowed	64	3.0%
	Denied	1134	52.9%
	No Diagnosis	946	44.1%

IN SUMMARY

	NUMBER	PERCENT
Total Cases	5194	100.0%
Allowed	79	1.5%
Denied	3005	57.9%
No Diagnosis	2110	40.6%

* These 1871 claims have the following 1134 malignant diagnosis:

Histiocytic leukemia -	3	Blood condition -	5	Endocrine cancer -
Myelocytic leukemia -	29	Lymphocytic lymphoma -	37	Skin cancer -
Hairy cell leukemia -	7	Hodgkin's disease -	17	Brain tumor -
Unspecified leukemia-	38	Respiratory cancer -	288	Melanoma -
Lymphocytic leukemia-	31	G.U. Cancer -	145	Cancer, musculo-skeletal -
Myelogneous leukemia-	21	G.I. Cancer -	192	Misc sites

** These 2144 claims contain 825 Nagasaki and Hiroshima claims consisting of leukemia and other malignancies 364; Misc. 286 and exposure only 175. None allowed.

15/3875 = 0.4% ALLOWED

3050
825
3875 TOTAL AV CLAIM

WRITTEN QUESTION FROM CHAIRMAN MURKOWSKI TO DR. BRADLEY AND THE RESPONSE

1. You were present at Operation Crossroads and yet you and Dr. Conard seem to have different perceptions of what safety procedures were followed. Can you explain this apparent lack of agreement?

1. I believe the answer lies in the very different duties we had. Dr. Conrad (if I remember his statement) was with Headquarters Staff, plotting reports of radiation on maps etc. I was in the trenches - if island surveys, boarding parties, dredging operations, fish and water collections, scrubdown missions etc. can be called 'trenches.'

2. I'm not sure exactly what is mean by "safety procedures."

   a) Protective clothing* I never used it and rarely saw it used, until we got to Kwajelein, some 4 weeks after the underwater shot.

   b) Oxygen rebreathers I used it once at Bikini, when opening up below decks on the submarine Skate.

   c) Instruments Insufficient in number, often unreliable, but all we had to work with.

   N.B. -> d) Film badges You seem to have the reports of only the low-level Eastman badges. My notebook indicates 2 more kinds - DuPont and Adlux - with ranges up to thousands of roentgens. You should ask for reports of these as well.

   e) Urinalysis Fraudulent. Pseudo-science.

   f) Efforts by Radiologic Safety Section Meeting Radiation for the first time in field conditions was a bit like first gas on the Western Front. I am sure we did the best we could, trying to get the job done in hectic, sometimes unknowable, situations.

Bradley

* Enclosed, some xerox photos from Adm. Blandy's "Operation Crossroads, The Official Pictorial 'Record" (1946) In the whole book you will find no picture indicating use of protective clothing.

P.217 depicts exactly what I remember of the surface and ship missions.

(Enclosures maintained in committee files.)

Dartmouth College HANOVER · NEW HAMPSHIRE · 03755
Policy Studies Program · 206 Rockefeller Center · (603) 646-2201

February 4, 1986

Senator Frank Murkowski of Alaska
Chairman, US Senate Committee on
Veterans' Affairs
SR-414 Russell Senate Building
Washington, DC 20510

Dear Sir:

At the GAO Report hearings in December you asked me if I had estimated my exposure during Baker Day.

I think I now have a reasonable answer from you. The pilot of our Patrol Bomber sent me a copy of his letter home on July 26, 1946. His story fits with mine quite closely and contributed some details I needed in order to work out the estimates.

Working from the map of the target area, page 12 of GAO Report, I figure we all got somewhere between

4r and 12r for that day's work.

The details, given on a separate work sheet, come out to 5.50r to 10.94r. These numbers can't be exact, but they sure must be nearer the truth than that film badge report which had us down for exactly 0.000r!

No, I don't think much of their "science."

Yours sincerely,

David Bradley

Rough estimate of radiation encountered by PBM-5 "Flying Dutchman" on Baker Day, 1946 in survey flights over target area beginning ½ to 2/3 hr after underwater detonation.

Lt. William Lower, Pilot
Dr. David Bradley, Rad. Monitor

- Our target area was 6m x 6m over which we did 9 legs for each elevation.
- The base surge and radioactive rain covered about 15 sq. miles of our area.
- PBM-5 flying at 140 mph. Therefore each leg was approximately 2.6 min. long.

Known Data	Low/High Estimate of Exposure
1. At 3000'	negligible
2. At 2000' Reading about 1.2r to 2.0r/hr., or "Human Maximum in 5 min" over hot part of target. (We could not have stopped survey at this point!)	0.15r to 0.24r
3. At 1000' We turn out after Leg. 4 i.e. readings of 30r to 50r/hr. (Roughly 0.5r to 1.0r per min)	Leg 1: 0 Leg 2: 0.25r to 0.50r Leg 3: 1.30r to 2.6r Leg 4: 1.30r to 2.6r
4. Over USS Saratoga 5 min	2.5r to 5.0r
Totals	5.50r to 10.94r

– David Bradley

Baker Day Test- 1946

from Lt. William B. Lower USN
PBM-5 patrol bomber

from his letters home
This was my ship & my skipper — D. Badley

Tomorrow, I fly the 'assistant secretary of war for air' to Bikini and then over to Einewetok."

9. July 26, 1946. BAKER DAY

"The tests are over with for this year and what a relief. Believe me now when I say it was a strain for all of us in many ways and because of many things.

Yesterday, BAKER DAY, I took off at 1 minute after 5 with 2400 gallons of gas and 19 people other than myself. The weather was good - too much so that there wasn't any wind, resulting in difficulty in getting off the water. Other than my crew, I had aboard a Fox News man with his cameras, two radiological monitors, and three big shots just along for the sights. They saw plenty!

At 8:35, the bomb detonated. We had a perfect seat east at 1500 ft. We were all looking directly at it for the times were given to us on radio two hours plus. We had to be in a certain position for the blast; we knew the exact second.

I wish I could describe it for this one was terrific! However, you probably received a word description over the radio. Just as soon as the area was cleared of the smoke and vapor, we were over the area starting our sweeps for radioactivity. At 4000 ft radioactivity was small. 35 minutes at this altitude then down to 3000. We began to hit hot spots, so on went our gas masks. It was hot as sin in the closed plane with that rubber binding your head and the sun cooking us or slowly stewing us to a simmer. We fought the plane through the 3000 foot sweeps; then down to 2000 feet. By this time, we were soaked. I could hardly hang on to the wheel, it was so wet and slippery but bn with the show'! At this altitude, the gammas, betas, and alphas began to hit pretty heavy. At one spot we had to make a pull-out for the meters were reading 'human maximon for 5 minutes'. 35minutes at 2,000 and we couldn't take anymore. The captain's plane had already pulled out to an up-wind position for fresh air. We did the same. After 10 minutes rest, I started in on the 1000 foot sweeps. The first three legs were not too bad but the fourth gave us plenty of radiation. We pulled out and prepared for another try but were ordered out by the Mt. McKinley (flag ship). You see, all our readings were radioed in from the plane by the monitor every few minutes, so the people working on the ships knew how much we were taking. They were doctors and scientists who knew as did our specialists.

The ships were badly damaged - many on the bottom and the Saratoga listing heavily to starboard. We knew that she was floating her last; so did the rank on the Mt. McKinley. We had been in the clear 30 minutes, now resting after the workout. The word came in to me, "Start in over the Saratoga and photograph for five minutes at 1000 ft". In we went with the cameramm blasting away. The Saratoga was barely afloat by then. We had to get out for the five minutes were over. We were tired to death. This was 2 o'clock already and we had 200 miles yet to go for home. Eleven hours of work. I just fell into my bed and didn't get up until 9 this morning.

In about ten more days, we start for Saipan and back to normal operations. For our nine planes, we did more operating than any patrol squadron in the Pacific during the war - kept our planes

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Policy Studies Program · 206 Rockefeller Center · (603) 646-2201

March 14, 1986

To: Sen. Frank Murkowski of Alaska
Committee on Veterans Affairs
SR-414 Russell Bldg.
Washington, D.C. 20510

From: David Bradley, M.D.

Addendum to Personal Radiation Exposures at Crossroads.

On the basis of 3 new pieces of information given me by the pilot of our survey plane, I have made calculations of our exposures on Baker Day, 1946.

These are not film badge resurrections but estimates based upon notes and memories of what happened that day. They cannot be exact; things were happening too fast in those flights over the target for me to read 6 instruments accurately.

But all three, computed separately, confirm a general impression that we aboard that plane were probably picking up somewhere between 2r and 17r total.

Against this I have a confirmed Navy report that the 2 remaining "recorded radiation exposures", for me on that day show "0.000 rem gamma."

That illustrates the kind of problem we veterans have in dealing with the V.A. and our dose records.

Yours sincerely,

David Bradley

Mar. 1986 - 3 New Calculations of Baker Day Radiation exposures on board PBM-5

I. Pilot: "human maximum for 5 min." at 2000ft altitude. (i.e. 0.1r in 5 min. Using 8 x (DOD) and 50 x (S. Warren). for exposures at 1000ft.)

Exposure: between 2.7r and 15.9r

II. Pilot: "we pulled out" on leg 4, 1000ft altitude. (i.e. as agreed upon, 30 to 50r per hour, not per day as recorded in book.)

Exposure: between 6.1r and 17.1r

III. Bradley to Pilot: "You could stay around there for 15 min." (This probably meant the task force's emergency maximum of 5r, in 15min.)

Exposure: 5.7r ±

WRITTEN QUESTIONS FROM CHAIRMAN MURKOWSKI TO COLONEL CALDWELL AND THE RESPONSES

You stated on page 5 of your testimony that film badge data was not of sufficient quality and quantity to be of value in determining the dose of anyone but the wearer. How do you know?

a. For those participants who did not wear a film badge, how would you suggest the Defense Nuclear Agency estimate the participants' exposure?

1. In reply to your first question:

a. This statement was a personal observation and opinion based in part on the following rationale:

(1) The primary purpose of the 0-2 R Personnel film badges used during Crossroads was to measure gamma and beta radiation levels. At the time, the real threat of the gamma radiation was considered as a continued exposure of 5 Roentgen per day over a three months period. This level was considered enough to cause sterility. However, the real threat at Crossroads was the alpha contamination received by an individual through ingestion and/or inhalation. The magnitude of the alpha contamination is what closed down the tests after its discovery on 9 - 10 August 1946. There were no useable instruments at Crossroads to detect the alpha contamination but the tracer gamma and beta emmissions were used to observe the location of the alpha contamination but not its magnitude.

(2) Because of the rapid decay of the gamma and beta readings following Baker Test, ie, the 15-31 August time frame the detection of the alpha contamination locations became a serious problem. In fact it is my opionion that the use of film badges after 1 October 1946 was just eye wash for the troops and not really effective from a health physics stand point.

(2) By examining the film badge issue data provided in the DNA report 6032F and by comparing that data to the sequences of events during Crossroads you find the following facts:

(a) Baker Test (25-31 Jul) =	3,064 badges	(18.4%)
(b) Decontamination Tests (1-10 Aug) =	1,226 badges	(7.4%)
(c) Ship Movement (11-31 Aug) =	5,482 badges	(32.9%)
(d) Ammo. Removal (1 Sep - 31 Dec) =	6,871 badges	(41.3%)
TOTALS =	16,643 badges	(100 %)

18.4 % of the film badges used at Crossroads were expended during the seven (7) day period after Baker Test primarily by Lagoon Survey Teams, Initial Boarding Teams, and Salvage and Fire Fighting Teams. At the very most 1500 individuals were involved in these operations (10,500 man days). This amounts to a film badge coverage of about 20%, when corrected for the number of film badges issued to RAD-SAF monitors. Please remember these are quick and dirty estimates when gamma radiation was at its higest level.

Next, the ten (10) day period during which decontamination of target vessels was attempted, we find the largest number of personnel being irradiated and the smallest percentage of film badges being issued (7.4 %). I estimate 8000 individuals aboard target vessels during this period (80,000 man days). This amounts to a film badge coverage of about 1.5 %. Please remember that this was the time frame when the gamma exposure would have been at the next highest values but unfortunately the film badge coverage was at it lowest coverage.

After the 10th of August the number of exposed personnel on target ships dropped by a factor of at least several hundered and the film badge coverage increased to over some 60 to 70 percent. However, the gamma radiation levels also had drastically dropped off in most area to below the 0.1 R/day tolerance. Also, Colonel Warrens final report to CinCJTF-1 indicated that he had recognized the problem of low film badge coverage and had taken drastic steps to greatly increase the ratio of film badge coverage and correct the problem.

Further, the contamination at Crossroads was not a uniform coating of radiation but rather of a splatered and splotchy character which was continually changed as the result of many factors.

b. For the above reasons I have concluded that the quanity of film badges issued during Crossroads was insuffient to produce a useable model from which to determine dose values for anyone except the person wearing a particular badge.

c. With reference to the quality of the film badges used at Crossroads, I again refer you to the fact that we are discussing 1946 technology and not the technology used some 40 years later. We are not discussing a laboratory environment. We are not discussing the age of plastic envelopes. We are talking about paper covered film badges which often had small pin holes in them, were worn in wet shirt pockets, were in a tropical humid environment, and were not refrigerated for several days at a time. We are talking about film badges which some time after 17 August were placed in rubber condoms to try to protect them from the water and humidity of the tropics. There were to many environmental factors bearing on the physical condition of the film badges during their use at Crossroads to conclude that they were of suffient quality to be reliable.

d. I refer you to the GAO report concerning the suspect nature of the film badges when little or no exposure was recorded so I don't think I can add much to their conclusions except that I concur.

2. How effective was the Radiological Safety Section in protecting participants from possible overexposure to ionizing radiation, and what evidence do you have to support your position?

2. In reply to your second question: " For those participants who did not wear a film badges how would you suggest the Defense Nuclear Agency estimate the participants' exposure?"

a. Quite frankly, I do not believe that dose reconstruction for film badge wearers or non film badge wearers or dose reconstruction of any type, after the 40 years since Crossroads - given the lack of supporting data the DNA and GAO states we do not have, is worth the paper it is written on. FILM BADGES MEASURED GAMMA AND BETA RADIATION !!! REPEAT. FILM BADGES MEASURED GAMMA AND BETA RADIATION !!!

SENATOR, THE PROBLEM IS THE QUANITY OF ALPHA RADIATING PARTICLES WHICH WERE OR WERE NOT INHALED AND/OR INGESTED BY CROSSROADS PARTICIPANTS !!!

b. I believe the presumptive relief is the answer to the problem. If further studies are to be conducted, I feel that these studies should focus on the most likely area of exposure to Alpha emitting particles and the connecting chains whereby they were introducted into the exposed human bodies. This data when compared to the health histories (not just mortality data) of men involved may produce a pattern which is usable.

3. You stated in your testimony that you were a Radiological Safety Monitor in Operation Crossroads and that you had 4 weeks of training prior to your first assignment at Test Able. Do you believe your training was insufficient?

3. In reply to your third question concerning the effectiveness of the Radiological Safety Section.

a. My answer, in some aspects we were very effective while in other aspect we were not very effective. There were many veriblales involved.

b. Once again CROSSROADS was a joint military operation not a laboratory experiment!

Like most quality control functions, management often time overides quality to meet production schedules to provide a cost effective product with an acceptable degradation in the quality of the product.

c. It would have taken the better part of a year to train all RAD-SAF monitors to a required level of proficiency. It may have taken a year or so to develope survey instruments, film badges, dosemeters, densitometers, etc, which were suitable and which had with the relibility needed to meet the requirements of Crossroads.

d. The level and types of radition experienced after Baker Test were unexpected. The magnitude of the contamination after Baker Test was not forseen. The rapidity of the spread of radiation to support ships was not expected. The ineffectivenss of the Navy's solution of decontamination,ie, "A clean sweep down fore and aft and take all trash to the fantail" was not predicted. Washing, scrubbing, foaming, acid, and washing again had little effect in reducing the real threat - ALPHA PARTICLES. All we succeded in doing was to remove the trace elements that told us where the alpha contamination was located. There were no useable instruments available to detect the presents of ALPHA PARTICLES.

e. The RAD-SAF personnel were effective in preventing a overdose expsoure to gamma radiation and reasonably effective in preventing overdose expsoure to beta radiation.

f. The Navy command structure wanted to sail their fleet into San Francisco with flags waving to demonstrate the "bomb" did not make the fleet worthless as a major contributor to the national defense effort. Ship Command positions were at stake. So, the decision was made - get those target ships clean and remanned or forget about a ship's command position. Corners were cut - risks were taken - no one dropped over dead - so everything turned out GREAT !!

g. Quite frankly, I have wondered many times over the last 40 years just how effective we realy were and I just can not put a value to that question. All I can say is that we RAD-SAF monitors tried our dead level best - I hope we did some good, but I truly fear the cards were stacked against us from the start.

3. In reply to your third question, "Was my training insufficient":

a. The original intent of my training was to provide a senior monitor with another set of eyes, ears, and instruments for his evaluation of the data. For this function, I feel I was well trained.

b. Due to the lack of monitors after 13 August 1946, I was utilized in the same manner as a senior monitor (often the only monitor with a work party). For this function I do not feel that I was given suffient training; however, better someone half trained than nothing in a pinch.

WRITTEN QUESTIONS FROM CHAIRMAN MURKOWSKI TO DR. CONARD AND THE RESPONSES

Question 1. You were present at Operation Crossroads and yet you and Dr. Bradley seem to have different perceptions of what safety procedures were followed. Can you explain this apparent lack of agreement?

Answer: Our differences in perception may be due to the fact that Dr. Bradley and I were involved in entirely different aspects of the safety program. I believe that my participation as a senior monitor in the Lagoon Patrol in Test Able and during Test Baker my supervision of monitoring of personnel involved with target ship activities gave me a better perception of the safety program.

Question 2. Dr. Conard, did GAO represent your views on beta radiation accurately? Did GAO consult with you regarding your experiences?

Answer: I do not recall GAO contacting me regarding my experiences at Crossroads. Their report refers to a statement by me that a case of severe beta radiation of the hands occurred in one individual handling radioactive filters from a drone plane at Crossroads. GAO is in error. This accident occurred in a later operation. The statement that beta radiation may cause cancer of the skin is true based on animal data but I do not know of a single case of cancer of the skin from beta radiation in human beings. The people of Rongelap who sustained numerous beta burns of the skin have not developed any skin cancer in over 30 years.

Question 3. Do you believe Crossroad veterans were exposed to dangerously high levels of radiation?

Answer: Based on my experiences with radiation exposure I do not believe Crossroads personnel were subjected to dangerously high levels of radiation. I asked Dr. E. P. Cronkite, a Crossroad's participant and well known expert on medical effects of radiation what he thought of the Radiological Safety program at Crossroads Operation. He said he thought it was well conducted. He agreed with me that it would be most unlikely that detectable radiation effects would develop in Crossroads participants.

WRITTEN QUESTIONS FROM CHAIRMAN MURKOWSKI TO MR. FULTZ AND THE RESPONSES

1. What are the implications of your review of the Crossroads dose estimates for participants in other nuclear tests?

Response

We do not know whether dose estimates for participants in other nuclear tests need to be adjusted for concerns similar to those addressed in our Operation Crossroads report. Since our review of radiation safety was limited to Operation Crossroads, projecting those findings to other operations would be speculative.

1a. What is the significance of the report? Is the message of your report that participants at Crossroads were exposed to dangerously high levels of radiation?

Response

The report's message is that Crossroads personnel were exposed to four specific radiation types--internal alpha, internal and external beta, and external gamma radiation. We found that the Defense Nuclear Agency's (DNA) calculation of exposure estimates for each radiation type needs adjustment because

--film badges were not reliable for measuring both external gamma and beta radiation, as intended, and were not worn by all Crossroads participants;

--personnel decontamination procedures did not provide adequate protection for Crossroads personnel throughout the operation; and

--DNA's dose reconstruction analysis for internal alpha and beta radiation has not properly estimated the possible personnel exposure from three potential pathways--inhalation, ingestion, and open wounds.

This adjustment, if undertaken by DNA, would result in higher radiation exposure estimates for Crossroads personnel. However, we do not suggest, nor does our Operation Crossroads report imply, that Crossroads personnel were exposed to levels of radiation in excess of current permissible radiation safety standards. That determination can only be made after DNA adjusts its exposure estimates in accordance with our report's recommendations.

1b. Can you provide the committee with the worst-case scenario? If so, could you provide the Committee with those radiation dose levels?

Response

We do not have the in-house expertise to develop worst-case scenarios.

2. How long do you believe it would take DNA to implement your recommendations?

Response

We cannot provide a precise answer, but a meaningful estimate could probably be made by DNA. However, given the large volume of information and analyses DNA already possesses, it should be able to implement our recommendations within a matter of months. We must point out, however, that DNA has indicated that it will not be implementing our recommendations.

3. Would you be able to establish more accurate exposure estimates? Do you have the expertise and resources to do so? How long would such an effort take?

Response

We have neither the expertise nor the data on the approximately 42,000 Crossroads participants, as does DNA, to develop Crossroads exposure estimates. In a meeting on January 10, 1986, with the staff of the Senate Committee on Veterans' Affairs it was made clear that we do not have the resources for such work. However, we could provide information and/or assistance to others implementing our Operation Crossroads report recommendations and review and critique the results of such action.

4. What comments could you provide to respond to any or all of the views presented by DNA at the hearing?

Response

There are several comments made by DNA at the hearing that we believe need further clarification and, in some cases, correction.

The first matter concerns the date of the two photographs appearing on pages 31 and 32 of our report, which show crews attempting to decontaminate unidentified Crossroads target ships. At the hearing, the DNA assistant nuclear test personnel review program manager stated that we established the date of the two photographs by asking him a possibly leading question as to when people first boarded these vessels. This is not correct. The DNA assistant nuclear test personnel review program manager told us it was his agency's educated guess that the photographs were taken on or about August 6, 1946. He made this determination, he said, on the basis of a set of numbers that appear on the back of a print of each photograph. Apparently, all of the photographs in DNA's collection on Operation Crossroads are so numbered and follow a particular sequence. Knowing this sequence and the dates of other photographs, DNA was able to establish the dates for the two photographs in question. It should also be noted that the photograph dates were included in our draft report and attributed to this manager but were not questioned by DNA in commenting on our draft report.

The second matter concerns the date of a photograph that we presented at the hearing with the caption "welder aboard the target ship USS Hughes during preparations for towing it after Crossroads." The photograph and caption were taken from DNA's historical report on Operation Crossroads. DNA said we were incorrect in stating the date of the photograph was July 28, 1946, because the ship was covered with foamite, a white firefighting substance, on July 27, 1946, and another photo from DNA's historical report shows the USS Hughes still covered with foamite several days later. Thus the date of the photograph could not be July 28, 1946. We agree. However, after reviewing certain Crossroads-related material, we believe a more likely date for the photograph is July 26, 1946--1 day after the Test Baker detonation--which makes the photograph even more radiologically significant. Initially, we used July 28, 1946, as the date of the photograph given that the photograph's caption indicated that the USS Hughes was undergoing preparations for towing and DNA's historical report on Operation Crossroads indicated that the USS Hughes was beached on July 28, 1946, after towing. However, according to an official Crossroads report prepared shortly after that operation, the USS Hughes was actually towed and beached on July 26, 1946--which we believe is a more plausible date for the photograph.

5. DNA's written testimony included the views of Gerhard Dessaurer on your report. Please respond to the views and concerns he raised in his affidavit.

Response

Dr. Gerhard Dessaurer was formerly chief of the film badge dosimetry section at Operation Crossroads. The following views were expressed by Dr. Dessaurer in his affidavit. Our evaluation of those views follows:

Dr. Dessaurer: At Operation Crossroads film badges provided a permanent record of the radiation doses received by personnel entering the Bikini lagoon after Test Able and again after Test Baker.

GAO: The permanent record Dr. Dessaurer refers to pertains only to the 15 percent of the Crossroads personnel who received a film badge to wear 1 or more days during the operation. As pointed out in our report, there were considerable inaccuracies in the exposure readings from the film badges but, because the film badges, for the most part, have been lost or destroyed, they cannot be rechecked for film badge inaccuracy. In addition, Dr. Dessaurer's 1947 report on film badge dosimetry, which was attached to his affidavit, recognized that the Crossroads film badges permitted the measurement of doses only down to 1/2 the daily tolerance for the operation, or down to 0.05 rem. Therefore, the Crossroads film badges were not worn and, thus, did not provide a permanent record for all personnel reentering the Bikini lagoon and, for those who did wear the film badges, did not measure the total amount of radiation present.

Dr. Dessaurer: Teams, approaching or boarding target ships, were preceded by monitors, technicians with portable instruments who measured the prevailing radiation intensity before letting the teams proceed with their tasks, including evaluating bomb damage, collecting biological specimens, and taking photographs.

GAO: We recognize that there were certain precautionary procedures established to determine conditions before allowing boarding teams on the target ships. However, such precautions were not always followed. For example, in an August 11, 1946 letter, Colonel Stafford Warren, head of the Crossroads radiological safety section, reported that by August 8, 1946, the boarding and clean-up parties were avoiding the radiation monitors. He reasoned that since they could not taste, feel, or see the radiation, the officers and men felt there was no radiation hazard and started entering or working in potentially radioactive areas with no radiation monitor present. In addition, as our report points out, that the decontamination procedures being followed by the boarding teams were inadequate.

Dr. Dessaurer: It was expected that, with certain precautions, most Crossroads personnel exposures would be well below 0.1 rem per day and only a few higher. The film badges confirmed this.

GAO: As previously indicated, only 15 percent of the Crossroads personnel received a daily film badge one or more times during the operation. Of the approximately 10,000 film badges issued to those individuals, however, 813--according to DNA's historical report on Operation Crossroads--recorded radiation exposure greater than 0.1 rem. In addition, because of inaccuracies associated with the film badges, many of the wearers of the remaining 9,187 badges may have received radiation exposure greater than 0.1 rem.

Dr. Dessaurer: The reproducibility, or the accuracy, of readings for films exposed to the same dose was better than 0.01 rem. Hence, in the range of interest (around 0.1 rem) the reproducibility was better than 10 percent.

GAO: According to a 1947 report on film badge dosimetry by Dr. Dessaurer, which was attached to his affidavit, calibration of film within the same film batch will provide reproducible readings to within ±20 percent, or at the 0.1 rem level, to within ±0.02 rem.

Dr. Dessaurer: The report speaks of harsh Crossroads conditions. The entire X-ray department of the air-conditioned hospital ship USS Haven was made available to my film badge dosimetry section. The space and equipment available was superb and was probably never approached before or after Bikini by any other film badge processing laboratory.

GAO: We do not dispute Dr. Dessaurer's assertion that every effort was made to control film badge processing activities at Operation Crossroads. However, in January 1985 the Reynolds Electrical and Engineering Company examined film badges formerly worn at Kwajalein Island during Operation Crossroads to determine, in general, the accuracy of Crossroads film badge dosimetry and, in particular, the presence of environmental damage from the influences of light, heat, water, or humidity. Based on the results of the examination, it is our view that harsh field conditions apparently existed at that operation. Specifically, of 137 film badges examined Reynolds found that 125 had suffered environmental damage during either Crossroads storage, exposure, or processing.

Dr. Dessaurer: The number of personnel put at my disposal was about twice what I could use effectively, hence only the more intelligent and responsible enlisted men were allowed to participate.

GAO: According to an August 7, 1946, memorandum from Colonel Stafford Warren, head of the Crossroads radiological safety section, the film badge dosimetry section consisted of one well-trained enlisted man who was capable of processing 100 film badges a day.

Dr. Dessaurer: The GAO report is in error to claim that the Crossroads film badges were incapable of accurately recording external beta radiation. The portion of the film intended for external beta radiation measurement did not record both external gamma and beta radiation.

GAO: According to a March 18, 1983, letter from the Department of Defense's expert consultant on film badge dosimetry to the Navy nuclear test personnel review program manager, the area of the Crossroads film intended for external beta radiation measurement was also affected by both high- and low-energy gamma radiation. Thus, the recorded external beta radiation exposures during Operation Crossroads were either grossly exaggerated or reported when no external beta radiation exposure had occurred.

Dr. Dessaurer: Doses above .01 rem of radiation were quoted in terms of the average of several readings taken on the same film.

GAO: Crossroads procedures required film badge dosimetry personnel to compare or read eight areas of each Crossroads film with a densitometer (a machine to read the film badges) to ensure accuracy. However, it is unclear whether that was actually done. For instance, in reviewing the original film badge ledger for the first 350 film badges processed at Crossroads, the ledger shows that 8 areas were read and recorded in the ledger for only 15 of the 350 films. For the other 335 films, only 2 readings were recorded. Therefore, for these 335 films, the average was based on readings from 2 areas rather than from 8 areas on each film, as required.

WRITTEN QUESTIONS FROM CHAIRMAN MURKOWSKI TO MR. GUARISCO AND THE RESPONSES

1. You stated in response to a question from Senator Cranston that you were on a "hot" ship for about a total of 1/2 hour during Operation Crossroads.

   a. Did you board that ship after Shot Able or Shot Baker?

   b. How many days after the detonation did you board that ship?

Pertaining to your requested Question Number One: I did not state that I spent a 1/2 hour on a hot ship during "Operation Crossroads." I stated I spent approximately a total of 2 hours on three different target ships after the Baker detonation.

Part (a) of Question Number One: Answer, After Baker.

Part (b) of Question Number One: Answer, 39 years is

a long time to remember, but I do know for sure it was a day or two before we left Bikini after the Baker detonation. It was either 5 days after Baker just before we departed for Ponape Island or 53 days after Baker, around the 22nd of September, shortly before we left Bikini again on our way to Pearl Harbor.

2. I am now requesting that the Defense Nuclear Agency locate and determine the health status of these veterans. What is your opinion of this request and what suggestions would you have in this regard?

Pertaining to Question Number Two: Answer, Please do not

request the DNA to locate atomic veterans. The last time the DNA was requested to locate atomic veterans was in 1983. They were supposed to locate atomic veterans who entered Hiroshima and Nagasaki as clean-up crews after the atomic bombing of those two cities. Many of those veterans had died or were dying from "multiple myeloma", a cancer of the bone marrow. The DNA has completely destroyed their creditability when they attempted to distort, confuse and alter the facts of the numbers of atomic veterans who had died and are still dying from multiple myeloma cancers. When the Office of Technology Assessment (OTA) issued their report on December 17, 1983 concerning the way the DNA had located atomic veterans, it was emphatically demonstrated that the DNA is willing to do anything, including perjuring themselves under oath if necessary, in order to cover-up the fact that the Department of Defense (DOD) used the atomic veterans as if they were nothing more than toilet paper. IAAV is positive your suggestion to have the DNA determine the health status of atomic veterans would be a terrible mistake.

To begin with, the DNA was created by the DOD in 1976 to promote nuclear weapons. The DNA is also the agency that the DOD has assigned to document the "Official Historical Record of the Atomic Veteran", and the part they played in ushering in the age of the nuclear weapons test-era. All necessary information that the Veterans Administration (VA) will consider in awarding VA claims for service-connected disability due to radiation exposure is based on the "Official Historical Records", and scenairo's created by the DNA. The DNA mandate to promote nuclear weapons and at the same time control the destiny of atomic veterans is contradictory when one considers that the atomic veterans who's lives have been destroyed by the same nuclear weapons that the DNA promotes, must look to the DNA for the proof to substantiate their claim for disability that would be pending before the VA. To put it very simply, IAAV would refer to this arrangement as -- "the fox guarding the chickens". Is it any wonder with 4,000 claims filed with the VA by atomic veterans, only 14 have been awarded. Is it any wonder why others realizing the hopelessness of it all, will not even attempt to file a claim.

The VA refuse to recognize any scientific or medical proof submitted by the atomic veterans from outside the government. The only such proof the VA will recognize is "all available medical and scientific information supplied by the DNA. The medical and scientific information that the VA must use to determine atomic veterans claims for disability is provided by the DNA, DOD, DOE, and the medical and scientific community employed by the military industrial complex including the nuclear weapons industry and REECo. In denying claims to atomic veterans the VA frequently uses the following words: the VA is sorry to inform you that all present available medical and scientific information indicates that you did not receive enough radiation exposure, etc., etc. This repetitious response can be traced back to the 1950's.

The following quotation for your information is from the notes of E. Cooper Brown, Director of NCRV: Quote. Our impression, and the conclusion we have drawn, is that out of a sensed need to protect "national security" an effort was initiated early in the history of nuclear weapons testing to suppress medical and scientific evidence about the adverse health risks associated with radiation. The Departments of Defense and Energy (previously the AEC), in collaboration with the nuclear weapons industry, appear to have been central to this effort, and to have enlisted the assistance of such "independent" bodies as the National Committee for Radiation Protection and Measurement (of which Dr. Sinclair, who was appointed a member of the VA Advisory Committee on Environmental Hazards, is currently President).

Up until only recently, this strategy appears to have worked. However, certain events have or will soon take place that will force "the cat out of the bag" with respect to radiation health risks. Given the fact that cancer latency periods are now expiring for many of those exposed to radiation early in the history of nuclear weapons development and nuclear energy use, it is not surprising that this should be taking place. Also of significance has been the fact that notwithstanding government efforts to suppress undesirable findings -- as was done with the Mancuso study of radiation health effects among workers at Hanford -- a small group of independent scientists has persisted in their studies to determine the true health effects of radiation exposure. Most notable among these is the research of epidemiologists Dr. Alice Stewart and George Kneale.

As the true adverse health effects of radiation exposure have surfaced, government and industry have suddenly found themselves on the losing end of a number of radiation damage claims. The most notable of these losses was last year's decision in Allen v. USA, in which a federal court found that the fallout from the Nevada atmospheric nuclear weapons tests had resulted in numerous cancer deaths in southern Utah.

In light of this change of events, it appears that the federal government, again joined by the nuclear weapons industry, has shifted its tactics and emphasis in an attempt to limit the legal and constitutional rights of radiation victims. Most obvious to the Atomic Veterans is the unrelenting campaign of the Departments of Defense and Energy to prevent meaningful legislation benefiting the veterans from passing Congress. Certainly the nuclear industry has played a significant role in influencing the radiation risk tables recently developed by Health and Human Services, as well as in shaping the fallout compensation legislation Senator Orrin Hatch is now seeking to introduce on behalf of his people in Utah.

One might have thought that the federal government would have been satisfied with having encouraged the federal courts to abuse the "Feres Doctrine" by using it to deny not only the constitutional rights of atomic veterans but those of their children as well. Obviously that has not been the case. To our shock and disbelief, Senator John Warner obliged all interested parties save the veterans (and other radiation victims) by quietly, in the waning minutes of last year's session, stepping in to legislatively absolve nuclear weapons contractors who had been sued by the atomic veterans by attaching an amendment to the Defense Authorization bill, Warner succeeded in placing the "Feres Doctrine" squarely in the path of veterans seeking the same justice that had been afforded Vietnam Veterans exposed to agent orange who had sued Dow Chemical.

Nor can one ignore the subtle but effective role "mainstream" scientists have played in perpetuating the myth that atomic veterans and others exposed to radiation from nuclear weapons testing have not suffered as a result of that exposure. Congress should analyze carefully the representations made on this subject by even such prestigious groups as the National Academy of Sciences. An obvious example of politics overriding science is the 1983 NRC/NAS findings of no increased incidence of multiple myeloma among occupation force veterans who served in Hiroshima and Nagasaki. After interviewing Mr. Seymour Jablon, coordinator of that study, Science Magazine reported that the study "was intended from the outset to serve a primarily political, not scientific, purpose". (SCIENCE, V.221, #4612, p.733, Aug. 19, 1983). A subsequent Office of Technology Assessment review of the NRC study confirmed the fact that the data on multiple myeloma simply did not support Jablon's conclusions:

> Except for assuming a population at risk of 20,000, at each step of the way the Council's methods contribute to an underestimation of the observed and an overestimation of the expected numbers of cases, making it less and less likely that an excess would be detected, even if it did exist. (OTA Staff Memorandum, p.22, Dec. 17, 1983).

The National Research Council's recent conclusion that Atomic Veterans have not suffered an unusual number of deaths from cancer or other diseases is equally suspect. The study, co-authored by Mr. Jablon, compared causes of death among 46,000 atomic veterans with the U.S. population as a whole. The NRC concluded from this study that "when data from all the tests are considered, there is no consistent or statistically significant evidence for an increase in leukemia or other malignant disease in nuclear test participants". What is not mentioned anywhere in the study, however, is Mr. Jablon's own conclusion, based on an earlier study of his, that no meaningful information can be drawn from a study comparing the health of veterans with that of the general public. In 1974, Jablon co-authored an article in the American Journal of Epidemiology, entitled "Effects of Selection on Mortality", in which he concluded: "Mortality comparisons cannot be made between cohorts that have been screened unequally, or between a screened cohort and the general population ..".

Why did Jablon and the NRC fail to use a proper cohort for mortality comparison? Why did they not refuse to conduct the study if they knew the conclusions would be meaningless? Why did they not at least acknowledge at the time of the release of the mortality study that their conclusions were meaningless" The answer to all of these questions appears to be the same as that given for the shortcomings of the earlier multiple myeloma study -- pressure from the Defense Department. Jablon, himself, has confirmed this. When Science Magazine asked him why he had not used a proper cohort, his response was: "we were under pressure from the Pentagon to get the study out quickly". (SCIENCE, June 21, 1985, p.1409)

The only remaining question is: Why is the Defense Department pressuring science to falsify information about the extent and nature of the health problems being suffered by Atomic Veterans? Perhaps it is time Congress found out. Unquote.

If we are ever to have justice and proper health evaluations for the atomic veterans it will have to be conducted by a prestigious gathering of the medical and scientific communities outside the government such as the Center for Radiation Studies (CARS) with participation from a portion of the doctors from inside and outside the government selected by atomic veterans with peer review by a committee of physicians, epidemiologists, scientists, and atomic veterans. The best way to locate affected atomic veterans is through a government funded program conducted by atomic veterans organizations's such as IAAV.

Sincerely,

Anthony Guarisco
IAAV Director

AG:mg

WRITTEN QUESTIONS FROM CHAIRMAN MURKOWSKI TO GENERAL PICKITT AND THE RESPONSES

Question 1. During the U.S. atomic weapons test program, who decided which servicemen would wear film badges?

Answer 1. Commencing with Operation WIGWAM in 1955 no one was allowed on a test site without a film badge. From 1945-1955, the radiation safety section issued film badges, dosimeters, or radiation detection (radiac) equipment first to those personnel who might be working near high levels of radiation; second to people who might be working in areas of low-level radiation, and third, if there were any remaining badges or equipment, to those working in the support areas which were expected to be free of radioactivity. For Operation CROSSROADS, Operation Plan 1-46 (with changes entered July 15, 1946) set the policy for the issuance of film badges. It stated that "Personnel badges" (film) will be carried on the person of all monitors and their assistants. The plan further states "The monitors will provide personnel badges (film) to personnel entering hazardous areas."

Question 1a. How was such a decision made?

Answer 1a. Since the policy stated in the CROSSROADS operation plan was to provide film badges to all personnel entering hazardous areas the only decisions were the identification of hazardous areas by the monitors and in cases where there were not enough film badges for everyone entering a hazardous area the selection of members of the group to be given film badges.

Extensive measurements using a variety of radiation detection (radaic) instruments were taken to determine the level of radioactivity in the lagoon water, target ships, and support ships and to define hazardous areas.

For cases where all of the members of a group were not issued film badges there is no documentation of the procedure followed in selecting which individuals in the group received film badges.

Question 1b. If the film badges were not assigned by random sample, how can you be assured that those wearing the badges represent the entire personnel population?

Answer 1b. For the task force as a whole film badges were not assigned randomly. They were assigned to the individuals entering hazardous areas.

For groups entering hazardous areas when there were not enough film badges for everyone, there is no documentation of the exact procedures used by the monitors to determine which individuals were given film badges.

Statement 2. Following Shot Baker personnel decontaminated target ships. Your film showed that sea water was one of the liquids used in decontamination. You stated during the hearing that the water was contaminated.

Question 2a. What was the level of radiation in the water?

Answer 2a. The lagoon water in the target area was contaminated by Shot Baker but lagoon water was not used for the decontamination of vessels until radioactivity levels in the water being used had decreased to less than 0.100 rem/day. The Director of Ship Material Technical Report states that "It was therefore necessary to wait until the water surrounding the target vessels was radiologically clear before proceeding with washing."

The USS HUGHES was towed away from the target area and according to the Director of Ship Material Technical Report "beached in radiologically clear water" before it was first washed down with salt water.

CROSSROADS documents state the initial washing of the target vessels reduced the radioactivity of these vessels by about 50 per cent.

Question 2b. How and how long does it take for the water to no longer be contaminated?

Answer 2b. The decrease in the level of contamination of the lagoon water was due to the decay of the radioactive isotopes and the natural flushing of the lagoon.

Immediately after Shot Baker the radioactivity of the lagoon water in the central part of the target area was greater than 1 rem/day. Outside this central area was an area where the level of radioactivity was less than 1 rem/day but more than 0.100 rem/day. A large portion of the lagoon was not contaminated directly by Shot Baker. By July 28, 1946 no area of the lagoon had a radioactivity level greater than 1 rem/day and by July 30, 1946 no area had a radioactivity level greater than 0.100 rem/day. On August 15, 1946 a message from the Chief of the Radiological Safety Section reported "lagoon water average (is) 0.02 to 0.03 R/per day."

Question 2c. Certain participants at Operation Crossroads have stated that they bathed in contaminated water, drank contaminated water, and cooked with contaminated water. How do you respond to this allegation?

Answer 2c. When water is distilled the contaminants are removed from it. Each ship had its own evaporators for distilling water and the task force also had a ship, the USS WILDCAT, whose sole function was to distill and store water. The distilled water was used for cooking and drinking.

For bathing, personnel were instructed to take only freshwater showers instead of the normal practice of showering first in salt water and then rinsing in fresh water. However, if someone did follow the normal showering procedure and showered using contaminated salt water, the fresh water rinse would remove the contamination.

Statement 3. There seeems to be lack of agreement concerning the amount of external beta radiation received by Operations Crossroads participants.

Question 3a. How and to what degree does beta radiation enter the body?

Answer 3a. Beta radiation was created by the decay of various isotopes contained in the contamination produced by Shot Baker. External beta radiation is produced by contamination that is outside of the body. Since the contamination is external, the beta radiation can only enter the body by penetrating the skin. The ability of the beta radiation to penetrate the skin depends on the energy of the beta radiation. About 99% of the beta radiation produced by the contamination from Shot Baker did not have enough energy to penetrate through the skin. A small amount of the beta radiation that was created by the contamination had enough energy to penetrate up to one half inch of tissue.

Question 3b. Where is it stored?

Answer 3b. Since external beta radiation is produced by contamination outside of the body, the only place to store the contamination is on the skin.

Question 3c. Are "beta burns" always associated with high levels of exposure to this type of radiation?

Answer 3c. "Beta burns" are always associated with high levels of external beta exposure. Even for exposure to high energy beta radiation that can penetrate through the skin "beta burns" would occur at exposure levels well below those needed to produce a biological problem in tissue under the skin.

Question 3d. Could one mistake "beta burns" for heat rash?

Answer 3d. According to experts who have treated people for "beta burns", one could not possibly mistake "beta burns" for heat rash. A "beta burn" is similar to second or third degree burn which causes blistering and cracking of the skin. Recovery from these burns othen takes several weeks. Scars and discoloring normally occur after the burn has healed. Heat rash, in contrast, is caused by sweat being trapped below the skin. This is evident by small, red raised bumps on the skin which tend to itch. They subside within a short time. Heat rash does not cause the skin to crack, or blister and does not leave scars.

Question 3e. What are the long-term health effects of beta exposure?

Answer 3e. There are no known long term effects from external beta radiation exposures. In theory, extremely high beta radiation doses which cause "beta burns" could cause skin cancer; but this has never been observed in humans. This theory is based on the observation that second and third degree burns which leave a scar tend to be the sites of skin cancer problems at a later date. However, the Marshall Island people who had "beta burns" as a result of Test BRAVO in 1954 have not had any incidence of skin cancer. These are the people with the highest beta dose received as result of nuclear testing.

Statement 4. GAO has recommended you improve your measurement of beta radiation. In a June 8, 1965 Atomic Energy Commission document from a Radiation Safety Monitor, it says:

> "Contamination of hands and face with beta emitters of intensities greater than tolerance is exceedingly common... It is almost impossible to enforce the wearing of gloves continuously on badly contaminated ships..."

Question 4. Is there an inconsistency between this statement and your position on the adequacy of beta dose estimates?

Answer 4. The excerpted quote is from an August 7, 1946 memorandum (declassified on June 8, 1965 by the AEC) from the Radiological Safety Advisor, Dr. Warren, to the Commander of Joint Task Force One, Vice Admiral Blandy. The document concerns the occupancy of target vessels as influenced by intensities of radiaton of various types on target vessels. The full quote reads:

> "Contamination of hands and faces with beta emitters of intensities greater than tolerance (0.5R/day) is exceedingly common. It is not infrequent to find personnel with amounts on the bare hands bordering on erythema dose levels (if not removed within 24 hours). It is almost impossible to enforce the wearing of gloves continiously on badly, contaminated ships..." (emphasis added).

Dr. Warren states that the contamination levels bordered on erythema dose levels if the contamination was left on the skin 24 hours. Washing the skin as required when boarding parties returned to their support ship removed the contamination so that a 24 hour exposure was not incurred.

Statement 5. You have said you will give the VA your new internal radiation report.

Question 5a. How should the VA use the report?

Answer 5a. The VA should use the report only as a reference. The CROSSROADS internal dose report looked only at the worst cases for internal exposure during Operation CROSSROADS. It did not attempt to assess each individual's dose. Rather, it simply said that all internal doses were less than those worst cases.

Public Law 98-542 enacted after the report was issued required an assessment of the internal dose situation for each claimant. In DNA's letter to Senator Alan K. Simpson in March 1984, DNA indicated that it would accomplish this task in two ways.

First, we would identify all the military units and their personnel who had an internal dose of less than 0.150 rem to the bone. The 0.150 rem criteria was selected because it is 1% of the National Council for Radiation Protection and Measurement (NCRP) guidelines for annual occupational exposure to an internal organ. If there is any indication that an individual or military unit could possibly exceed the 0.150 rem screen, a detailed reconstruction for the unit or the individual would be conducted to provide 50 year committed doses for all relevant internal organs.

Question 5b. Will the VA have to recalculate dose estimates based upon information provided in the report?

Answer 5b. The VA does not calculate dose estimates. DoD is calculating internal dose estimates based upon the prescription given in 5a. above for all current and previous VA claimants with radiogenic illnesses. We are transmitting the specific dose information to the VA and the claimant. All of the Nuclear Test Personnel Review (NTPR) publications, such as the CROSSROADS internal dose report, are provided to the VA only as references to explain our efforts and methodologies.

Question 5c. If so, does the VA have the expertise to do so?

Answer 5c. As stated above, the VA does not calculate doses. The DoD determines the radiation exposure for each claimant and transmits this information to the VA and the claimant.

Question 5d. What specific efforts will you take to assist the VA in interpreting the report?

Answer 5d. Both the VA and claimant are provided with a point of contact if they have any questions about how the dose was determined. If our reponse draws upon one of the published dose reconstructions, such as the CROSSROADS internal dose report, we indicate this in our letter. All of these publications are provided to the VA as reference material.

They are also available for review or purchase by any claimant. DoD's NTPR officials also regularly meet with representatives of the VA's Office of Compensation, Board of Veteran Appeals, and Nuclear Medicine Service. These meetings and exchanges are designed to improve the adjudication process.

Statement 6. You state that personnel decontamination procedures were adequate and appropriately followed. We have, however, seen DoD photographs and film of men cleaning and monitoring ships after a nuclear test with no protective clothing.

Question 6. What do the photographs indicate? How can you state that adequate precautions were taken?

Answer 6. The photographs and the film show men working on vessels but the dates that both the photographs and the film were taken are not known accurately and the identifications of the vessels shown are not positive. Therefore, the level of contamination on the vessels at the time when the photographs and film were taken cannot be determined.

These pictures, even if taken on contaminated vessels, are not relevant to the issue of whether personnel decontamination procedures were adequate. Personnel decontamination involves the physical removal of radioactive contamination from the body. This was accomplished during Operation Crossroads by changing clothes and showering.

Statement 7. You have stated that even if the Defense Department implemented all of GAO's recommendations, exposure estimates would only increase 10% for CROSSROADS participants. However, you stated that wearing contaminated clothing for a day could have resulted in a radiation exposure dose which is 18% of the total dose estimate.

Response to statement 7. The statement that wearing contaminated clothing for a day could have resulted in a radiation exposure dose which is 18% of the total dose estimate was made by GAO.

Question 7a. Did you include in your overall estimate an estimate for contaminated clothing?

Answer 7a. The estimate for contaminated clothing was included in the overall estimate.

Question 7b. And if not, wouldn't there be an inconsistency between the 18% estimated increses?

Answer 7b. There is no inconsistency in the estimates. We cannot address the GAO derived value of 18% of the total dose estimate since no explanation of how it was derived is contained in the GAO report, but a brief explanation of how we calculated our estimate of 10% is given below.

The total dose at Operation CROSSROADS was 16,380 man-rem.

If 2000 men each wore clothing contaminated enough to give them a dose of 0.01 rem per day for ten days, their total exposure would be: 2000 men x 10 days x 0.01 rem/day = 200 man-rem

The total dose of 16,380 man-rem would increase to 16,580, an increase of slightly more than 1%. Similiar calculations were performed for other suggestions made in the GAO report and the total increase in man-rems was 1231 man-rem or 7.5% of the total. This 7.5% was rounded up to 10%.

Statement/Question 8. GAO has questioned your reconstructed doses. In light of this, why wouldn't you make every effort to improve these re-estimated doses?

Answer 8. We believe that the dose reconstructions are adequate and that the conclusions of the GAO report are flawed and not supported by the data.

Question 8a. Would there be any positive benefits to doing so?

Answer 8a. No.

Question 8b. For example, would there be a benefit to eliminating the remaining doubts on the part of the veteran as to accuracy of film badge and dose reconstruction estimates and extent of radiation exposure?

Answer 8b. There would be a positive benefit in eliminating the veterans' doubts concerning dose estimates.

Question 9. What information do you have about the health status of the CROSSROADS veterans? Are these veterans ill, and if so, from what illnessess do they suffer?

Answer 9. No comprehensive scientific study has been conducted on the health status of CROSSROADS veterans. There are only two indicators of their health status. One is through information received via the DNA toll-free number. The other is by the number and type of Veterans Administration claims.

Since 1978, DNA has maintained a toll-free telephone service (800-336-3068) to encourage veterans of the atmospheric nuclear tests to call DNA. This number has been distributed via the Home Town News Service to every media source in America, has been broadcast on major television shows such as "60 minutes" and has been distributed to special military organizations such as ship reunion committees.

As of December 30, 1985 exactly 9,200 CROSSRAODS participants have called DNA and reported their status, or reported the death of a CROSSROADS veteran. The statistics for this group are presented below:

HEALTH STATUS AS REPORTED BY CROSSROADS PERSONNEL

	NUMBER	PERCENT
Personnel	9,200	
Reporting Cancer	1,086	11.8%
Deceased	407	4.4%
Deceased and had Cancer	261	2.8%

The figures above should not be regarded as a scientific study, since all illnesses are unconfirmed, and information about deceased veterans is largely obtained from their relatives.

As a basis for comparison, 36% of all Americans will eventually get cancer (excluding epidermoid skin cancer), and over 20% of all Americans who die, die from cancer (Source: CANCER STATISTICS 1985, American Cancer Society).

As of December 11, 1985, 548 (1.3%) of the 42,000 CROSSROADS personnel have filed claims with the Veterans Administration (VA). Based on information supplied by the VA to DoD, 443 of these cases have a clear indication of illness. Of the 443, cases 273 (62%) involve non-radiogenic illnesses. Only 170 (0.4%) of 42,000 CROSSROADS veterans have filed a claim for a radiogenic illness. Of the 170 cases, the following radiogenic illnesses were diagnosed:

CROSSROADS VA CASES

Type of Radiogenic Illnesses	Number of Radiogenic Cases	%of Total Radiogenic Cases
Skin Cancer	45	26.5%
Lung Cancer	45	26.5%
Leukemia	17	10.0%
Colon Cancer	15	8.8%
Bladder Cancer	10	5.9%
Esophageal Cancer	10	5.9%
Kidney Cancer	8	4.7%
Multiple Myeloma	6	3.5%
Bone Cancer	4	2.4%
Stomach Cancer	4	2.4%
Pancreatic Cancer	4	2.4%
Thyroid Cancer	2	1.1%

Liver Cancer	0	0.0%
Salivary Gland Cancer	0	0.0%
Breast Cancer	0	0.0%

All of these percentages are essentially the same as for the other atmospheric nuclear test series, and the general population.

Question 9a. What attempt has been made to use existing medical technology to examine Operation CROSSROADS participants to measure the level of radiation currently in their bodies?

Answer 9a. The Defense Nuclear Agency and the National Institute of Health have sponsored research to develop urinalysis techniques which could be used to infer internal radiation exposures. This process, mentioned by Dr. Robert Conard in the December 11, 1985 hearings, is being tested currently and could be employed to help define the level of internal radiation. As of yet, however, this process has not been employed on CROSSROADS veterans. Nor has any other biomedical measuring method been used on CROSSROADS veterans, although some veterans of other tests series have undergone bioassay studies.

Question 9b. With respect to the question of accurate internal radiation dose estimates, why doesn't DNA use a whole body counter to measure internal radiation on CROSSROADS veterans?

Answer 9b. If the contaminants possibly inhaled or ingested by CROSSROADS participants can be detected by these methods, we will work with the Veterans Administration to set up a program to make these measurements. The Congress recognized the potential usefulness of these methods in Public Law 98-542 which directed the National Institute of Health to report on the most useful methods and their application, and enter into an interagency agreement with the Veterans Administration on the possible use of these devices. We recommend waiting for the NIH preliminary response, due in May, before proceeding with such a program.

Question 9c. I have stated that I believe it is vital to locate and determine the health status of participants of this test. How will DNA assist in this project?

Answer 9c. The Department of Defense's Nuclear Test Personnel Review (NTPR) has identified virtually all of the CROSSROADS participants. The Navy NTPR team has consolidated its data base on the 37,500 Navy and Marine Corps CROSSROADS veterans. This data base includes such relevant information as name, rank, identification numbers, unit, dose, place and date of birth, medical record information, and current address (if known). The Army NTPR data base for the 4,500 CROSSROADS Army and Air Force veterans is not yet complete due to problems resulting from the fire in the St. Louis National Personnel Records Center in 1973. However, the Army has the records which identify these 4500 men. They expect to complete their work by September 1987.

The Department of Defense has employed several methods to locate CROSSROADS veterans. As stated before, we issued press releases to every media source in America to solicit calls on our toll-free telephone service. We provide information on the telephone service to any news source we are aware of who is interested in this issue. We also provide this information to interested veterans organizations. In addition to the toll-free telephone service, we have sought out known CROSSROADS veterans. For example, we have checked other sources of information such as rosters of retired military prsonnel, phone directories and the records of the Veterans Aministration.

One source of information remains closed to us. This is the records of the Internal Revenue Service (IRS). Access to these records is limited to a few specified exemptions. The most appropriate exemption is through an agreement with the National Health Institute of Occupational Safety and Health (NIOSH), which authorizes IRS records to help locate personnel for certain medical follow-up studies. If the Veterans Administration pursues a medical follow-up study of CROSSROADS veterans, perhaps they can negotiate with NIOSH and IRS to obtain these records. This would also require an agreement with the Social Security Administration (SSA). NIOSH/IRS requires a social security number, and in 1946 very few servicemen had a social number to enter into their records. Using the data collected by NTPR, perhaps VA could negotiate an agreement with SSA to identify current social security numbers.

Statement 10. It is difficult for the Congress to assess the technical aspects of the concerns raised by GAO and the counterpoints made by DNA.

Question 10. What, in your opinion, would be the course of action you would recommend to the Congress in order to be able to accurately evaluate the information provided by both GAO and DNA?

Answer 10a. Congress should have the GAO report reviewed by technically qualified personnel.

Question 10b. Would you have any reservations if the Office of Technology Assessment reviewed the GAO and DNA information.

Answer 10b. We welcome an objective evaluation conducted by qualified personnel.

WRITTEN QUESTIONS FROM CHAIRMAN MURKOWSKI TO MR. THOMPSON AND THE RESPONSES

Question 1. You stated in your testimony that film badges were only issues to officers. What evidence do you have to support this statement?

Answer 1. I do not have any evidence to support my statement that only officers were issued badges on the U.S.S. Kenneth Whiting AV-14. I do, however, have a personal recollection that this was the case.

Question 2. Page 4 of your testimony says that all your members "have muscle and joint problems". Are you able to verify this and demonstrate that these disabilities are not caused by genetic or other causes?

Answer 2. I talk to Crossroads veterans almost every day. Almost all of them complain of joint and muscle problems. Dr. Susan Lambert (on the Advisory Board of NARS) would be much more qualified to answer, than I, the question of whether or not these disabilities are genetic, or from other causes. Dr. Dorothy Legarreta submitted additional written testimony on Crossroads veterans; the number is 1,054.

Question 3. Page 4 of your testimony says that 600 of your members are Operation Crossroads veterans. In light of my desire to locate and determine the health of these veterans, would you be willing to share (subject to Privacy Act protections) the names and addresses of your Crossroads members with the appropriate individuals in order to accomplish this goal?

Does your organization attempt to compile and aggregate information such as disease-specific and test-specific data in order to determine the health trends of its members? If no, do you believe it would be important and useful to compile such information?

Answer 3. NARS keeps records of all who inquire or join our organization. We have considerable data and would be willing to share it with your committee, or anyone else that would be able to help determine the health of Crossroads veterans. Since the Defense Nuclear Agency has the names of these veterans I would think that they would be more able to complile this data. Our organization hasn't the funds to carry out a comprehensive study - we depend on grants and membership dues for our budget.

Question 4. You stated in response to a question from Senator Cranston that you were on a "hot" ship for about a total of 2 hours during Operation Crossroads.

a. Did you board that ship after Shot Able or Shot Baker?

b. How many days after the detonation did you board that ship?

Answer 4.a. As near as I can recollect, it was after shot Baker.

b. I believe it was about a week.

I also boarded a German ship (Prinz Eugen) and a Japanese ship (Battlewagen). The purpose of my visit was to see the effects of the bomb on electronic gear. I had already decided not to re-enlist in the Navy so as I stated to Senator Cranston, I was just along as a member of a military entourage.

DEFENSE NUCLEAR AGENCY
WASHINGTON, D.C. 20305

6 March 1986

Honorable Alan Cranston
United States Senate
Washington, D. C. 20510

Dear Senator Cranston:

This is in reply to your letter of January 24, 1986 regarding questions to be included in the record of the hearings held on December 11, 1985. Our response to your eleven questions is attached, along with the requested enclosures.

In December 1982 the National Academy of Sciences (NAS) was asked by the Defense Nuclear Agency to look at the methodology used by the Nuclear Test Personnel Review to determine radiaion exposures for participants of the atmospheric nuclear tests. The NAS assembled a prestigious group of physicists, biologists, statisticians, dosimetry experts and other scientists, some with direct experience in the atmospheric nuclear tests. Their study, Review of the Methods Used to Assign Radiation Doses to Service Personnel at Nuclear Weapons Tests was released on February 7, 1986 and is attached. Because of the unparalleled reputation and expertise of NAS, and the direct relevance of their study to the December 11, 1985 hearings, I ask that you include the entire 52 page study as part of the official record of the hearings.

Sincerely,

John L Pickitt

JOHN L. PICKITT
Lieutenant General, USAF
Director

2 Attachments
1. Answers to 11
   Questions (w/encls)
2. NAS Study

(Enclosures and attachments retained in committee files.)

Statement 1. Please describe in detail exactly what materials have been developed by or for DNA reconstructing what happened at Operation CROSSROADS.

Question 1A. What entity actually produced each of those reports?

Question 1B. What role did DNA play in overseeing the production of those reports?

Answer 1A & 1B. In 1978, the Department of Defense (DOD) began a major research effort concerning the DOD personnel involved in atmospheric nuclear tests. This program is entitled the Nuclear Test Personnel Review (NTPR). One aspect of this program is to identify, collect, and review material relevant to Operation CROSSROADS. The objective of this effort is to:

(1) identify the DOD participants at CROSSROADS.

(2) determine their radiation exposures.

(3) publish a history of the Operation.

(4) make public various documents on CROSSROADS.

(5) interact with CROSSROADS veterans on their participation.

(6) respond to Veterans Administration (VA) inquiries.

To accomplish this task the DOD assembled special research teams within each military service. (Since the Air Force was not in existence in 1946, the Army assumed responsibility for CROSSROADS Army Air Force personnel.) This program was under the direction of the Defense Nuclear Agency (DNA). Also, contractors were hired by DNA, Navy, Air Force (for the other test series), and Army to assist in their research. This research involved searching over 100 archives/libraries, and assembling over 100,000 pages of CROSSROADS documents. The major end products of this work are:

(1) Assembling a data base of CROSSROADS participants, with relevant information such as name, rank, identification number, etc.

(2) Determining a radiation exposure for each participant.

(3) Publishing the methodology used for this dose determination and submitting this methodology for peer review by the National Academy of Sciences.

(4) Publishing a historical report on CROSSROADS.

(5) Declassifying and making public key CROSSROADS source documents.

(6) Relaying this information to any CROSSROADS veteran who contacts DOD.

The data base was designed and formated so that ultimately all information could be centralized in the records of the Reynolds Electrical and Engineering Company (REECo). REECo serves as the government's repository of atmospheric nuclear testing personnel records. Funding for REECo was supplied by DNA and the Department of Energy (DoE). DNA, DoE, and the NTPR teams helped design the 101 field data base. Each service NTPR team also developed a data base tailored to their needs, which then meshes into the master data base at REECo. Both the Navy and the Army relied on contractors to assist them in researching records. The Navy employed the Historical Evaluation and Research Organization and JAYCOR. The Army also employed JAYCOR. The determination of radiation exposures was accomplished by reviewing all available records for recorded exposures, and by assembling a computer calculated model of the radiation environment. This computer model was created by Science Applications International Corporation (SAIC). The NTPR team assigned each CROSSROADS participant a dose based on the computer model and all the available recorded information about that man. The recorded information ranged from deck logs, medical records, and dosimetry records, to classified reports. Literally tens of thousands of records were searched. Each man had his relevant information entered into the data base.

Three reports were published on the methodology used to calculate these doses. DNA had primary responsibility for technical guidance, although each service provided technical input. These reports include:

Analysis of Radiation Exposure for Naval Units of Operation CROSSROADS (VOL I-III), DNA-TR-82-05. Prepared by SAIC.

Internal Dose Assessment - Operation CROSSROADS, DNA-TR-84-119. Prepared by SAIC.

Radiac Instruments and Film Badges Used at Atmospheric Nuclear Tests, DNA-TR-84-338. Prepared by JAYCOR and REECo.

This methodology was published in the Federal Register for comment:

> "Guidance for the Determination and Reporting of Nuclear Radiation Dose for DOD participants in Atmospheric Nuclear Test Program (1945-1962)", Federal Register, Vol 50, No 203, Oct 21, 85.

DNA submitted its methodology in 1982 to the National Research Council of the National Academy of Sciences (NAS). The NAS convened a prestigous panel of physicists, biologists, statisticians, dosimetry experts and other scientists to review this methodology. DNA provided funding and technical information but no guidance due to the nature of the work and the rules of the Academy. The recently released Review of the Methods Used to Assign Radiation Doses to Service Personnel at Nuclear Weapons Tests concluded:

> "The NTPR has developed procedures that permit satisfactorily estimates to be made of the external doses received by these participants. There are uncertainties in the dose estimates, but it appears that 99% of the personnel received doses of less than 5 rems, which is approximately the average dose received by the general population during the last 30 years from exposure to natural radiation and the use of ionizing radiation during medical procedures....
>
> Methods used to assign internal doses associated with inhalation or ingestion of radioactive material were in general based on unsupported assumptions. The methods often attempted to relate internal dose to the magnitude of external radiation and tended to overestimate possible internal doses....
>
> Although the Committee concentrated only on methods, it found no evidence that the NTPR teams had been remiss in carrying out their mandate. If any bias exists in the estimates, it is probably a tendency to overestimate the most likely dose, expecially for internal emitters or when the statistical procedure for assigning dose is used."

The historical report, Operation CROSSROADS, 1946, DNA 6032F, was prepared by KAMAN-TEMPO on contract to DNA. This 564 page report was part of the 41 volume series on DOD participation in atmospheric nuclear testing. KAMAN-TEMPO conducted the basic research and prepared the drafts of the report. A first and second draft of the report was prepared and each was reviewed by DNA, the NTPR military service teams, DoE, REECo, JAYCOR, and SAIC. Technical guidance was provided by DNA.

To date, DNA has declassified and made public over 500 CROSSROADS documents. These documents are either at the National Technical Information Service, the Library of Congress, or the DoE public archive on atmospheric nuclear testing, the Coordination and Information Center (CIC) in Las Vegas, Nevada. Prior to release, these documents were reviewed by DNA, DoE or the Navy. A listing of the CROSSROADS documents at CIC is at enclosure 1.

Since 1978, the NTPR program has corresponded with 9,200 CROSSROADS participants, relating the information that is described in detail in our response to question six. DNA provided the basic standards for these responses. This work was performed by DNA and the NTPR service teams with assistance from their contractor JAYCOR, and the SAIC calculated model.

In addition, the NTPR service teams have responded to approximately 550 requests from the Veterans Administration for individual dose information for CROSSROADS veterans. This work was done by the NTPR service teams with help from their contractor JAYCOR and the SAIC calculated model. DNA set the standards for these responses when it published its regulations "Guidance for the Determination and Reporting of Nuclear Radiation Dose for DOD Participants in the Atmospheric Nuclear Test Program". DNA also sponsors individualized dose reconstructions for CROSSROADS VA claims whenever an existing reconstruction is not applicable. DNA coordinates this work among the services and provides technical guidance to its contractor SAIC. DNA is also funding Safety Sciences to develop a data base of previous VA claims and sort them by whether the illness is radiogenic (can be caused by radiation) or not. DNA provides technical guidance on this contract.

Statement 2. The DNA Rebuttal (on page 91 of the GAO report) refers to DOD review of 35,000 CROSSROADS personnel medical records.

Question 2A. Who actually reviewed these medical records?

Question 2B. Please describe in detail the qualifications and background of these individuals, including information on whether these individuals have medical backgrounds.

Answer 2A & 2B. The review of the 37,500 CROSSROADS medical records was part of a large Navy project to identify and review the medical records of the approximately 107,000 Navy participants in atmospheric nuclear testing. This project can be broken down into five components:

(1) identify the Navy participants.

(2) design a data base for the relevant information.

(3) retrieve the medical and personnel records from various sources.

(4) review and enter all relevant data.

(5) perform quality control checks on the entered data.

While your questions center around the fourth component, reviewing the medical records, a brief summary of the other components is useful.

A specially created Navy office, the Navy Nuclear Test Personnel Review (NNTPR), was placed under the direction of a Navy Captain. His staff included various Navy personnel with experience as historians, health physicists and records managers. The office included two Navy historians and five historians under contract from the Historical Evaluation and Research Organization. Their primary task was to identify the units and personnel involved in nuclear testing.

One data base format was developed for all the military services and Department of Energy (DoE) personnel involved in atmospheric nuclear testing. The format designed has 101 fields for each man's record. A civilian contractor, JAYCOR, was hired to develop the software for the Navy portion of the NTPR data base. This was done because the full 101 field format contained many items which were unique to the other services and DoE. Each military service and DoE used their own modified version of the data base, which was then meshed into the master data base.

The Navy and its contractor JAYCOR retrieved the medical and, in some cases, the personnel records for these 107,000 people. Most of these records were at the St. Louis National Personnel Records Center. Some of the records were in other places, such as at the Veterans Administration or in the possession of Navy personnel still on active duty. Over 99% of all the medical records were eventually retrieved and reviewed, including about 37,500 out of the 37,899 Navy personnel at CROSSROADS.

The medical records were then examined by a team of JAYCOR reviewers. Their job was to abstract key information and enter it into the data base. This initial screening group was a mixture of people with backgrounds ranging from sqience and biology to history and liberal arts. Their education level ran from at least a high school graduate to those with masters degrees.

Enclosure 2 is the 119 page "Personnel Records Procedures" given to these reviewers. These procedures were "to be followed without deviation", (emphasis in the original). These procedures provided exacting guidance on what to look for and where to look for it in a medical record. Prior to reviewing these records, the JAYCOR people underwent two weeks of intensive training by Navy personnel, including sample abstraction exercises and critiques.

In addition to these rules, several large 3' by 4' poster boards were placed in the front of the room where the initial screeners worked. These served as constant reminders to the screeners to look for the following symptoms occuring from the first day of the veterans participation in a nuclear test till six weeks following his participation:

epilation (loss of hair)
nausea
vomiting
malaise and weakness
keratitis (inflammation of the cornea)
gastrointestinal bleeding
bleeding of the gums
beta burns of the skin, (increased pigmentation, raised areas known as macules or plaques)
diarrhea
anorexia (loss of appetite)
blood in urine
susceptibility to infection of wounds

In addition the poster boards provided a list of cancers which might not be instantly recognizable as such (e.g. multiple myeloma). It also had the thresholds for a normal complete blood count (CBC). CBC data which fell within the normal range could be entered into the data base without additional consultation.

The procedures instructed the reviewers that they were only the initial screeners of these records. As the procedures state:

> "No one is expected to interpret technical medical data contained in some Medical Records. Instead, pages are to be 'clipped red'. Data falling into this category include:
>
> - All cancer terminology except cancer in family.
> - Bioassay results.
> - Blood test results (e.g. CBC's).

- Possible blood abnormalities.
- Other technical medical data possibly related to nuclear testing (e.g., unknown tumors, radiation sickness sequelae, physician's analyses, results of medical claims relating to radiation, etc.)."

Furthermore any items in the medical record not understood by the initial screener were 'clipped red' for further review. These records were then passed for evaluation to a team of personnel with specialized experience and training. Each one of these specialists were involved in reviewing the medical records:

R. Thomas Bell, III, Commander, MSC (USN). CDR Bell developed the procedures and criteria for the NNTPR medical records review by JAYCOR personnel, and conducted training of those personnel. CDR Bell is a health physicist who has been involved in the NNTPR since 1978. He has a Master of Science Degree in Physiology and Biophysics and has over 22 years professional and research experience in health physics, occupational health, and radiation safety.

Dr. James Bond. Dr. Bond was employed at JAYCOR as an Assistant for Medical Record Review for the NNTPR contract. He has a Ph.D. in Physics with post-doctoral research in Bio-medicine. He has conducted extensive research and published numerous articles on biophysics and radiation effects.

David W. Brown. Mr. Brown served as the JAYCOR NNTPR liaison to the National Personnel Records Center (NPRC) in St. Louis, Missouri. He holds a Master of Arts in Health Services Management. He served 27 years in the U.S. Navy as a Hospital Corpsman and a Medical Service Corps officer, with considerable experience in medical records management, including work as the Navy liaison at the NPRC.

Kathryn L. Dismukes. Ms Dismukes reviewed medical and other records for JAYCOR under the NNTPR contract. She has been an American Society of Pathologists board-certified Histopathological Technician specializing in exfoliated cell cytology/pathology with an emphasis on the effects of radiation therapy.

Payne Harris, MD. Dr. Harris was employed by JAYCOR as an advisor on the NNTPR contract. Dr. Harris is a retired Army Colonel who was actively involved in biological research and radiation safety at many atmospheric nuclear tests. He has conducted research and published over 100 papers and articles on the medical aspects of nuclear detonations, radiobiology, physics, biochemistry, genetics, cancer, and neuro-physiology.

Edward Healy. Mr. Healy is a retired Master Chief Hospital Corpsman with 26 years experience in military medicine and medical administration procedures including medical record entry, medical record maintenance, and medical facility maintenance. Mr. Healy was a qualified instructor in Navy Aviation medicine. He also has a Bachelors of Science Degree in Health Care Services.

Earl T. Jones. Mr. Jones, a former Navy health physics and radiation specialist, was involved in reviewing medical records for JAYCOR under the NNTPR contract. Mr. Jones is a retired Chief Hospital Corpsman with 20 years experience with military medical records. Mr. Jones also has a Bachelors Degree in Human Resource Management.

Dr. Bette Siegel. Dr. Siegel served as an Assistant for Medical Records Review at JAYCOR under the NNTPR contract. She has a Ph.D. in physiology and biophysics and has conducted substantial research in radiobiology.

Dr. Joseph Soukup. Dr. Soukup was the Technical Support Coordinatior and an Assistant for Medical Records Review at JAYCOR for the NNTPR. He has a Ph.D. in pharmacology and physiology and has done extensive research and teaching at medical schools in these fields.

William H. Vernon. Mr. Vernon acted as NNTPR liaison with the National Personnel Records Center (NPRC) at St. Louis. Mr. Vernon is a retired Navy Medical Service Corps Officer with 30 years experience in Navy records management, including being Bureau of Naval Personnel representative at the NPRC. Mr. Vernon also has a Masters Degree in Management.

These people reviewed the medical records for relevant data and returned it the record abstractor for entry into the data base.

At the end of the day, all the work performed by the record abstractor was submitted to a quality control (QC) person. The QC person reviewed approximately 10% of each abstractor's work for the day. If any errors were uncovered by the QC person, the entire day's work was returned to the record abstractor for review. The QC person did not tell the record abstractor where the error(s) occurred. The record abstractor had to review the previous day's work, locate and correct all errors, and return it to the QC person for another check. This method proved highly effective in ensuring accuracy.

Question 3. Please provide for the Record, and to the GAO for its comments for the Record, documents which demonstrate that comprehensive safety and decontamination procedures were in place for the duration of the operation.

Answer 3. The term "safety and decontamination procedures" is extremely broad and includes dozens of documents involving such things as avoiding toxic gases, fighting fires, evacuating the lagoon prior to a detonation, positioning aircraft at shot time, operating and cleaning out evaporators, etc. It appears that you are referring to safety and decontamination procedures for personnel who might be exposed to radiation. Our response will address this interpretation.

The core principles of radiation safety and personnel decontamination remained the same throughout the operation. The two primary components of the radiation safety were to detect and avoid radiation if possible and to keep any radiation exposure below 0.100 rem per day. These precautions were detailed in the Commander Joint Task Force One, Operation Plan 1 - 46. A copy of this is at enclosure 3.

The primary component of personnel decontamination is the same that was used in the beginning of the Manhattan Project and is still in use today; to remove and launder contaminated clothing and to shower. This is such a basic procedure that very few documents address how someone is to launder and shower. However, except for a small component of about 400 specialists, these procedures were issued to all of the relevant parties prior to their need.

Contamination of personnel was not a problem after Test ABLE. This is because the ABLE fireball did not touch the lagoon or ships, and almost all of the loose fission products which could cause contamination were trapped in the radioactive cloud which travelled north of Bikini. For Test BAKER, many loose fission products remained on the target ships and personnel who boarded these ships may have become contaminated.

For the first six days after Test BAKER only a very small group of men boarded target ships where they might have become contaminated. This group of about 400 men referred to above consisted mostly of highly trained initial boarding teams, scientists, radiation safety personnel, and salvage experts. No specific instructions on showering and laundry were issued to them in the first five days after BAKER. However these common sense procedures were already developed for the Manhattan Project. Members of the Radiation Safety Section have stated that these procedures were common knowledge. At CROSSROADS they may have been simply transmitted by word of mouth to such a small group of specialists, perhaps during one of the many training sessions or staff meetings. The first written reference to the laundry of contaminated clothing and showering is in the July 30, 1946 memorandum at enclosure 4. According to the author, this instruction and the other procedures in the memorandum were immediately adopted by Task Group 1.1, who contributed many of the men in the group of 400 specialists.

On August 1, 1946 many of the target vessels were initially boarded by their crews for inspection or decontamination. (Five ships not caught in the base surge were reboarded prior to August 1, 1946. However, this posed no threat of contamination to their crews, since the source of the radioactivity was on the outside of the hull below the water line and no one could come in contact with it). The other target ships had contamination and personnel boarding them could become contaminated. However, the instructions issued to these men prior to boarding told them to shower and change their clothes completely upon their return to their support ship. Special laundry instruction were also issued. These instructions, dated on July 31, are at enclosure 5. They were issued before any decontamination work aboard target ships was conducted after BAKER.

On or before August 4, Colonel Stafford Warren, Chief of the Radiological Safety Section, issued the "Radiological Safety Regulations". This is before large scale decontamination efforts began on August 6, 1946. Although undated, the document issues instructions to ships which will depart Bikini after midnight August 4, 1946. This document is at enclosure 6. Members of the radiological safety section have attested that these regulations were widely disseminated and used. The document provides detailed procedures on personnel and laundry decontamination. For example:

> Clothing worn by personnel on contaminated target vessels are exposed to varying amounts of radioactivity. Continued wearing of this clothing or careless disposal endangers wearer or anybody coming in contact with the clothing. Therefore:
>
> a. All personnel returning from contaminated target ships should be checked for contamination (clothes, shoes, hands etc.).
>
> b. Any contaminated clothing having a reading of over 0.1 R/24 hrs after laundrying should be bundled and weighted for dumping overboard outside lagoon. The LCT will collect such clothing daily at 0900 to be

dumped at sea. Vessels having contaminated clothing to be disposed of notify CTG 1.2 prior to 2100 on the day proceeding the day dumping is required.

c. Clothing with Geiger reading less than 0.5 R/24 hrs. may be washed on the ship as follows:

1. Small amounts may be washed in buckets reserved for that purpose only, and the dirty water thrown directly overboard.

2. Large lots requiring ships laundry equipment must be washed separately from regular ships laundry. Before regular laundry can be washed the equipment must be thoroughly cleaned with alkali (baking soda) and abrasive soap such as bon ami and washed down completely. Personnel handling contaminated clothing or cleaning equipment will wear rubber gloves. Equipment should be monitored after cleaning.

d. Shoes which give a reading of over 0.5 R/24 hrs. should be scrubbed with a brush, soap and water for 10 to 15 minutes. If reading is not reduced to tolerance by this means, shoes should be discarded.

e. All personnel should take a thorough shower using plenty of soap and water. If the hands are contaminated they should be scrubbed with a brush, soap and water for ten minutes by the clock and monitored again, the process being repeated until readings are well below tolerance.

Statement 4. In his December 11 testimony, General Pickitt provided information on the DOD Nuclear Test Personnel Review (NTPR) program. On page 2 of the testimony, one of the listed NTPR mission efforts is to "sponsor studies to ascertain whether test participants experienced any unusual incidences of death or illness."

Question 4A. Please specify what studies the NTPR program has sponsored?

Answer 4A. The DOD and the Department of Energy (DoE) jointly sponsored the National Academy of Sciences (NAS) mortality study of approximately one-quarter of all the atmospheric nuclear test participants. This report was released in June 1985. The Department of Defense has also sponsored studies of the occupation forces near Hiroshima and Nagasaki, and assisted the Centers for Disease Control in their study of Test SMOKY personnel.

Question 4B. How much has the DOD spent in connection with the overall NTPR program since initiation and for any such death or illness studies?

Answer 4B. The overall DOD NTPR costs through FY 85 are approximately $54 million. The NAS mortality study cost DOD approximately $786,000 directly (the DoE also supplied $698,000 for the study). This cost is only a narrow facet of the overall DOD costs on this NAS project. DOD also paid for the design, development, research and compilation of the data base used by NAS for the 46,000 men in the study. These efforts were intertwined as part of the overall NTPR program and the costs cannot be separated out with any certainty. The NAS mortality study of approximately one-quarter of all the test participants "found no consistent evidence of increased deaths from cancer or other illnesses for the veterans overall". A copy of the NAS study was provided as part of the DNA testimony at the December 11, 1986 hearing.

Statement 5. Also on page 2 of the testimony, a list of NTPR program accomplishments states that 165,000 of the estimated total of 200,000 DOD nuclear test participants have been thus far identified, and that dose reconstructions have been completed for 160,000 of those participants.

Question 5A. How many of those 160,000 and 165,000 were Operation CROSSROADS participants:

Answer 5A. Operation CROSSROADS involved approximately 42,000 military and civilian personnel. The Navy has identified 37,808 Navy and DOD civilian personnel and entered them into their data base. This is believed to be all of the Navy personnel and DOD civilians involved at CROSSROADS. The Navy has assigned radiation exposures for 36,254 (96%) of these people. The Marine Corps identified 585 Marines at CROSSROADS, calculated radiation exposures for 406 of them, and entered this information into their data base. The Army has responsibility for Army and Army Air Force personnel at CROSSROADS. For various reasons, including the 1973 fire in the St. Louis National Personnel Records Center, the Army personnel for CROSSROADS have not been entered into their data base. However, the Army has recovered records for about 3,000 of the 4,000 Army CROSSROADS personnel.

Question 5B. What average radiation exposure level or levels have been established for Operation CROSSROADS participants?

Answer 5B. The average exposure for Navy, and DOD civilian personnel at CROSSROADS is about 0.390 rem gamma, less than 0.150 rem internal to the bone, and 0.0 rem neutron. The average exposure for CROSSROADS Army personnel has not been calculated, but is believed to be less than the averages for Navy personnel. This is because about 75% of the Army personnel at CROSSROADS were stationed with support and air units at Enewetak and Kwajalein Atolls, and had no potential for radiation exposure from the tests at Bikini Atoll.

Question 5C. How many of the approximately 200,000 nuclear test program participants had estimated exposures exceeding 5.0 rem? How many exceeding 25.0 rem:

Answer 5C. As of January 1986, the NTPR program has identified 1,452 personnel whose exposure exceeded 5.0 rem gamma in 12 consecutive months. Included in this total are 39 personnel whose exposure exceeded 25.0 rem gamma in 12 consecutive months.

Question 5D. What is the highest estimated exposure level received by any participant in the nuclear weapons test program?

Answer 5D. The highest gamma and internal exposure for any DOD participant in nuclear testing occurred as a result of Test BRAVO during Operation CASTLE in 1954. The highest gamma exposure was 52.0 rem gamma for a member of the Weather Unit at Rongerik Atoll. This exposure was determined from the veteran's film badge. The highest internal dose for a DOD participant was also for the Weather Unit at Rongerik. The 50 year dose commitments resulting from the inhalation and ingestion of fallout radioisotopes are calculated for the following organs:

THYROID	190.0 Rem
LOWER LARGE INTESTINE	76.0 Rem
UPPER LARGE INTESTINE	44.0 Rem
SMALL INTESTINE	13.0 Rem
LUNG	13.0 Rem
STOMACH	6.4 Rem
ENDOSTEUM	3.4 Rem
LIVER	1.6 Rem
BONE	1.4 Rem
RED MARROW	1.3 Rem
KIDNEY	1.2 Rem
PANCREAS	less than 1.0 rem
TESTES	less than 1.0 rem

Because of their distance from the BRAVO detonation, the Weather Unit at Rongerik received a neutron exposure of 0.0 rem. The highest neutron exposure received by a DOD participant in atmospheric nuclear testing was for the eight officer volunteers at Test SIMON, Operation UPSHOT-KNOTHOLE. Their dose is calculated to be 28.0 rem, using a relative biological effect (RBE) factor of 13.

Question 5E. What is the highest estimated exposure level received by any Operation CROSSROADS participant?

Answer 5E. The highest external gamma dose for a CROSSROADS participant was 4.24 rem, based on film badges readings and calculated (reconstructed) exposure. This dose was for a member of the Radiation Safety Section who worked as a radiation monitor. As a whole body dose, the 4.24 rem also applies to individual organs. In addition to the dose from external gamma, the organs could have received some additional dose from inhalation or ingestion of radionuclides. Calculations have been shown that inhalation doses to CROSSROADS personnel were less than one rem to all organs. Ingestion doses, even assuming hypothetical worst case conditions, were also less than one rem (see Answer 11). Moreover, different organs predominated the internal doses for the two pathways, with the lungs generally dominating for inhalation, and the thyroid or GI tract dominating for ingestion. Thus, total internal dose was less than one rem for all organs. To this dose, the external dose is added to obtain the total dose. In the case of the monitor above, the total dose to all organs, for all pathways, is less than 5.0 rem. All personnel at CROSSROADS had neutron exposure of zero rem, owing to their distance from the detonations.

Statement 6. With reference to the DNA procedures for contacting and informing DOD nuclear test participants of their estimated exposure levels.

Question 6A. How many participants have been contacted by the DNA.

Question 6B. What have they been told.

Answer 6A & 6B. There are two general types of correspondence used by DOD to inform a veteran of his radiation exposure. First, is the approach taken for any veteran who exceeded 5.0 rem per twelve consecutive months. Second, is the response given to anyone who contacts DOD regarding his participation in atmospheric testing. Each approach will be addressed separately.

The present federal guidelines permit occupational exposures up to 5.0 rem gamma per calender year. In 1979 the DOD initiated a program to identify, locate and contact any veteran who exceeded 5.0 rem per 12 consecutive months. Using the records of DOD, VA, the Social Security Administration, and the Internal Revenue Service, the Department of Defense identified 1,452 veterans who exceeded the 5.0 rem threshold. DOD has been able to locate and contact 1,015 (70%) of these veterans. This is a very high percentage considering the number of military records destroyed in the 1973 fire at the National Personnel and Records Center in St. Louis, and that very few of these men had social security numbers (which are vital for locating people) during their period of military service. Using a DNA prescribed format, each service developed a standard letter in accordance with that service's style of correspondence. Enclosure 7 is an example of a letter sent to a Navy veteran (the man's name and address were deleted in accordance with the Privacy Act). You will note that this 67 page packet:

(1) Informs the veteran of his exposure.

(2) Explains the significance of this exposure.

(3) Advises him of a free medical examination available at a VA hospital.

(4) Provides a listing of VA hospitals.

(5) Provides a letter to give to the VA, along with the evaluation form.

(6) Advises the veteran how to file a VA claim if he is so inclined.

(7) Provides a summary of the veteran's participation in nuclear testing.

(8) Provides a summary of the nuclear test series he was involved in, and where he can obtain further information.

(9) Provides a summary of the NTPR program.

(10) Provides an acknowledgement form with a franked envelope.

(11) Assures the veteran that this information is protected by the Privacy Act.

The second type of correspondence is one generated as a result of the veteran contacting DOD. The veteran may have contacted DOD via its toll free number (800-336-3068) or through routine correspondence. First, the veteran is provided an interim letter. The basic letter currently used is found at enclosure 8. This letter:

(1) Acknowledges and summarizes the phone call or letter sent by the veteran.

(2) Explains the purpose of the NTPR program.

(3) Discusses the relative biological effects of radiation.

(4) Provides him with information on free medical care through the VA.

(5) Provides copies of the Centers for Disease Control morbidity study and the National Academy of Sciences mortality study.

(6) Promises a future follow-up.

(7) Assures the veteran that this information is protected by the Privacy Act.

After researching the veteran's participation, he is sent a letter which, at the minimum:

(1) Confirms his participation in a nuclear test series.

(2) Summarizes his exposure.

(3) Summarizes the relative biological effect of the exposure.

(4) Summarizes his activities.

(5) Summarizes the test series he was part of, and where he can obtain futher information on this.

(6) Summarizes the NTPR program.

(7) Assures the veteran that this information is protected by the Privacy Act.

There are minor variations between services to accomodate each agency's style, and there are some variations to address specific issues raised by the veteran. However, most responses are similar to the one found at enclosure 9. Approximately 31,500 of these final notification letter have been mailed. Also, several thousand other letters were returned or not mailed because the veteran moved and left no forwarding address.

Question 6C. Is the VA routinely given the names of participants identified by DNA and their estimated radiation exposure levels?

Answer 6C. The only time the Department of Defense provides this information to the VA is in response to specific requests, such as for a Veterans Administration claim.

Question 6D. How many of the participants identified by DNA are still alive? How many are known to be deceased?

Answer 6D. Of the 1,452 over 5.0 rem personnel identified by NTPR, 164 (11.3%) are known to be deceased. Of the 51,873 people who have contacted DNA on its toll-free telephone, 2,016 (3.8%) subsequently died or were reported by a relative as deceased.

The National Academy of Sciences (NAS) completed a mortality study of 46,186 veterans involved in 5 nuclear test series. This study, comprising approximately one-quarter of all the veterans involved in nuclear testing, determined that 5,113 (11%) of these veterans were deceased. A copy of this study was included as part of the DNA testimony at the December 11, 1985 hearing.

Question 6E. How many of the participants identified by DNA are suffering from an illness or disability which might be radiation-related?

Answer 6E. DNA has only two sources of information available to them regarding illness among the veterans of nuclear testing.

First are the follow-up studies conducted by the Centers for Disease Control (CDC) and the National Academy of Sciences (NAS). The CDC studied the 3072 participants at Shot SMOKY in 1957. A copy of the CDC study is at enclosure 10. The men at SMOKY were also included in the NAS study. The NAS conducted a mortality study of 46,186 veterans of 62 nuclear tests. Their results showed the following numbers of deaths through 1982 for each of the 15 illness regarded as radiogenic (possibly caused by radiation) by the VA:

ILLNESS	NUMBER OF DEATHS	% OF ALL DEATHS IN STUDY
1. Leukemia (except chronic lymphatic leukemia)	56	1.1
2. Thyroid Cancer	2	0.1

ILLNESS	NUMBER OF DEATHS	% OF ALL DEATHS IN STUDY
3. Female Breast Cancer	0	0
4. Lung Cancer	363	7.1
5. Bone Cancer	11	0.2
6. Liver Cancer	7	0.1
7. Skin Cancer	43	0.8
8. Esophegael Cancer	30	0.5
9. Stomach Cancer	33	0.6
10. Colon Cancer	83	1.6
11. Pancreatic Cancer	51	1.0
12. Kidney Cancer	24	0.5
13. Urinary Bladder Cancer	9	0.2
14. Salivary Gland Cancer	2	0.1
15. Multiple Myeloma	16	0.3
Total	730	14.3

The second source of information available to us is the information provided to us by veterans on the toll-free telephone service. The veterans report any ailments they may have. None of these ailments are confirmed, and more often than not the veteran offers only general diagnosis or symptoms. For this reason, we only statistically record whether the veteran reports having cancer or not. Of the 51,873 people who have contacted DNA exactly 5,300 (10.2%) have reported some form of cancer. In addition, 2,016 (3.8%) callers subsequently died or were reported by a relative as deceased.

The VA holds two other sources of information that could provide a useful response to this question. One is the illness reported by each veteran when seeking compensation from the VA. The other is the results of the physicals taken by personnel whose dose exceeded 5.0 rem per 12 consecutive months.

Question 6F. Please provide sample copies of all standard notification letters used by the DNA to inform DOD nuclear test participants of their estimated exposure levels.

Answer 6F. These were previously enclosed as part of our response to question 6B.

Question 7. Of the approximately 52,000 participants who have contacted DNA through its toll-free telephone line, how many were Operation CROSSROADS participants?

Answer 7. As of December 20, 1985 exactly 9,200 CROSSROADS participants called DNA and reported their status, or reported the death of a CROSSROADS veteran.

Statement 8. On page 4 of the testimony, "two special mass mail-outs to the veterans who have called NTPR" are described.

Question 8A. Please provide for the hearing record sample copies of the letters that were sent out in these two mail-out.

Answer 8A. The two special mail-out packages are at enclosures 11 and 12.

Question 8B. How many nuclear test participants acknowledged receipt of these letters.

Answer 8B. Although an acknowledgement of receipt was not requested for either mail-out package, many veterans did take the time to write back to us or call us on our toll-free telephone. Approximately 630 letters and phone calls were received by DNA concerning the June 1983 mail out found at enclosure 12. In addition, approximatey 1,040 letters and phone calls were received by DNA concerning the June 1985 mail-out found at enclosure 12.

Question 8C. How many letters were returned as undeliverable?

Answer 8C. Approximately 8,000 letters were returned as undeliverable from the June 1983 mailout found at enclosure 1. Through various efforts, DNA was able to forward about 1,500 of these packages. Approximatley 5,000 envelopes were returned as undeliverable following the June 1985 mail-out found at enclosure 2. Once again, through various means DNA was able to forward 2,800 of these packages.

Statement 9. On page 5 of the testimony, in addressing the NTPR efforts in the area of dose reconstruction, it is stated that, "When the exposure estimates were high, as they were for some participants in Operation Castle-Bravo and some of the air crews who participated in cloud sampling, we reported the high dose."

Question 9A. For this purpose, what constitutes a "high" exposure level?

Answer 9A. For the relative terms of NTPR, a dose exceeding 5.0 rem gamma is considered high. This is because 5.0 rem is the guideline for occupational exposure in a calender year and because 99% of all exposures at nuclear tests were less than this amount. It should not be misconstrued as a hazardous exposure level.

Question 9B (i). What are the exposure estimates referred to for the participants in Operation Castle-Bravo?

Answer 9B (i). The 28 man Weather Unit at Rongerik Atoll, referred to in our answer to number 5, is considered high by NTPR standards. However, over 95% of all the CASTLE participants received less than 5.0 rem gamma.

Question 9B (ii). What are the estimates referred to for the air crews who participated in cloud sampling?

Answer 9B (ii). Any cloud sampler who exceeded 5.0 rem in 12 consecutive months is considered high in NTPR terms. Many of the cloud sampler crews did not exceed 5.0 rem gamma.

Question 9C. What actions has the NTPR program taken in the cases of "high" dose estimates?

Answer 9C. Any person whose dose exceed 5.0 rem per 12 consecutive months would fall under the NTPR's five rem program. As described in our response to question 6, NTPR would try to locate the veteran and send him the package of information found in enclosure 7. These personnel also received the mailouts found at enclosures 11 and 12.

Question 10. Also on page 5, the testimony notes that dose estimates have been recalculated for Operation CROSSROADS "when new data became available". What specific new data are you referring to?

Answer 10. The new data found in the Stafford Warren Collection prompted DOD to recalculate doses for Operation CROSSROADS personnel.

Statement 11. On page 15 of the testimony, the DNA and GAO worst-case scenarios for radiation exposure are referred to and compared. Please describe and compare in more detail these two scenarios.

Answer 11. The scenarios refer to hypothetical cases of ingesting radionuclides. There is no indication that this occurred; only a theoretical possibility. In fact, several precautions were set up to prevent this from occurring.

The ingestion of radionuclides could have occurred if the food became contaminated (loose fission products fell on the food itself) and the food was then eaten. At CROSSROADS, such a scenario is extremely unlikely. This is because rules were set up so that contaminated target ships could be boarded for only short periods of time by a limited number of men. This meant that most personnel returned to their support ship to eat and had no potential for ingestion of radionuclides. Some men might have stayed on a target ship long enough to require meal. For these people, rations and water were brought aboard the target ships and kept in an area free of contamination. Since the food and water were sealed, they were not contaminated, and ingesting the food would not have led to any internal dose.

GAO has hypothecated that perhaps this food could become contaminated either from dropping the opened food on a contaminated spot, or by transferring contaminants that might be on a man's hands onto the food. Even though there is no discussion of this occurring in any of the thousands of CROSSROADS documents, DNA agreed to calculate a hypothetical case of ingestion. A reasonable worst case was determined to be an engineering team which was aboard USS NEW YORK for 16 hours on August 8, 1946. These men were below decks in the lightly contaminated engineering spaces. It is possible that they ate three meals aboard the ship that day.

Several high sided assumptions are used to reconstruct the internal dose for this hypothetical case. First, rations were taken by a sailor to a contaminated area to be eaten for each meal. Second that prior to eating each meal, the sailor placed his hand on a contaminated surface. Third, that a significant amount of contamination was transferred to the hand and, fourth, that the sailor transferred all of these contaminants into into his body either by wiping his hand on the food or licking his hand clean. All of these assumptions, particularly the last, are very unlikely. Yet even with these assumptions, the resultant 50-year organ dose commitments are less than one rem for any organ.

The GAO suggested that crews of target ships that were remanned for extended periods (such as USS PARCHE) would have accrued higher ingestion doses than for the DNA example. The PARCHE was a target submarine which was contaminated on the outside, particularly on its wooden decks. However, on August 6, 1946 when the PARCHE was first opened and inspected after BAKER, it was reported as radiological safe on the inside, except for the conning tower and main induction pipe. Topside, decontamination parties of 8 to 40 men were working to rid the outside of the ship of contamination. From August 6 - 8, the topside of PARCHE was scrubbed down using boiler compound and applying a lye bath. From August 14 - 18, PARCHE was scrubbed down using lye. On August 19, sulfuric acid was used to remove rust. On several occasions during this period salt water was used to hose down the ship. Finally on August 20, the wood decks of the ship's bridge were ripped up in order to rid it of remaining contamination. On August 22, the entire crew reboarded the ship and departed for Kwajalein.

According to the GAO scenario, the crew of PARCHE ingested radionuclides while eating food aboard ship. During and after Test BAKER, the crew of PARCHE was berthed aboard USS BOTTINEAU and USS FILLMORE. However, commencing on August 6, part of the 61 man crew went aboard PARCHE for limited periods. This is detailed below:

DATE	ON BOARD	DEPARTED	NUMBER OF MEN
6 August	1300	1500	12
7 August	0900	1100	10
	1300	1530	--
8 August	0900	1100	20
9 August	0900	1100	20
	1300	1600	20
10 August	0830	1100	30
11 August	0900	1200	8
12 August	0830	1100	20
12 August	1300	1530	20
13 August	0830	1130	20
13 August	1300	1530	20
14 August	0830	1100	30
15 August	0900	1400	--
15 August	1400	1800	--
16 August	0830	1530	40
17 August	0830	1530	40
18 August	0900	1500	20
19 August	0900	1730	--
20 August	0900	1600	--
20 August	1600	0100	--
21 August	0900	1500	--

Note: -- indicates that no number was given.
Source: Ship Deck Log

On August 15, the men of PARCHE were granted permission to eat aboard the ship. Based on the stay times for the boarding parties, the crew ate one meal per day aboard PARCHE during this period. On August 22, the Radiological Safety Section declared PARCHE safe for remanning by its crew. From this point forward, of course, the crew ate all meals aboard ship except for three days at KWAJALEIN when the crew was berthed aboard USS FILLMORE.

GAO suggested that PARCHE might be a worse hypothetical case than the NEW YORK. To explore this possibility, we not only assumed that, while the ship was underway, a man ate three meals a day below deck, but in addition, for the seven days prior to remanning, one meal was taken topside each day. Prior to each meal, he placed his hand on a contaminated surface and picked up significant contamination; in turn, he transferred these contaminants to his mouth by licking his hand, just as was assumed for the hypothetical NEW YORK case. These are worst case assumptions for several reasons. First, boiler compound, lye, and acid were used to decontaminate the ship. Yet we assumed that the man touched these surfaces and then licked his hand without regard to the cleaning solutions. Second, if the cleaning solutions and scrubbing could not remove the tightly-fixed contamination, it is doubtful that casual contact could dislodge the contaminants. In view of this, the transfer fraction from surface to hand of 0.01, used also for the NEW YORK calculation, is generous. Third, it was assumed that contamination was ingested each and every time a meal was eaten.

We ran this calculation from August 15 to October 14, the date that PARCHE reached Mare Island Naval Shipyard, at which point the ship's crew would have taken their meals ashore while preparing the ship for decommissioning. Results show that not only are internal doses less than one rem for any organ, they are in the aggregate about two-thirds of that calculated for the NEW YORK. The calculations for these two hypothetical scenarios is at enclosure 13. The 50-year dose commitments of less than one rem for these hypothetical cases may be compared to the NCRP Guidelines, which permit exposure up to 15 rem for most organs in any one year.

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January 9, 1986

To: Anthony Principi, Cynthia Alpert, Bill Brew
Committee on Veterans' Affairs
SR-414, Russell Senate Bldg.
Washington, DC 20510

From: David Bradley MD

I

You asked me to comment on medical problems which seem to have a relation to previous radiation exposure.

1. Please read pp 205-216 in my book for the simple fundamentals of radiation damage.

2. Our knowledge began with the "radium dial workers" but was greatly expanded by insect and animal experiments, and crudely confirmed in U.S., U.K., by the Japanese, Marshall Islands victims, and now in reports from U.S. and U.K.

Prior to Bikini (1946) Stafford Warren had helped set up something like 420,000 mice and rat experiments, and similar studies on millions of fruit flies.

Gammas aren't very different from X-Rays and rats, mice, rabbits, etc. respond much like Homo sapiens.

3. All radiation is destructive. All reports are on the side of damage. No one has seen a beneficial result—an "Einstein Fruitfly"—from any level of radiation.

Except for quibbles about "linear-quadratic" etc. in very low level radiation, every one recognizes that dose and damage have a more or less straight-line relation.

The long-latency - 8 to 40 years for malignancies - is not in doubt, but not understood

II

Radiation is to leukemia exactly as smoking is to lung cancer. No one knows why tobacco causes lung cancer; cancer comes on years later.

No one can prove, in any single instance, that this lung cancer was produced by smoking. However, Surgeon General Koop has no hesitation in asserting that "statistical" relation.

I read that only about 10% of heavy smokers die of lung cancer. I believe the proportion of radiogenic leukemias and cancers would be smaller, as a guess, 3% to 5%.

If the DOE was in business of making cigarettes, and could order soldiers to smoke 2 packs a day, as it ordered us into areas contaminated by radiation or Agent Orange, would it not now have to compensate the soldiers developing lung cancer?

III

Now to your specific questions about presumptive radiogenic diseases:

1. Judge Bruce Jenkins in the "Downwinders" case (knowing he'd have the hell appealed out of him by U.S. Govt.) chose the most conservative of awards:

8 leukemias

1 cancer of lung

1 cancer of thyroid

There are many forms of leukemia. Whether lymphoma should be included is debatable. My guess is it should.

2. Japan These conditions, according to Kanji Kuramoto of the Committee of Atomic Survivors, are compensated for by the Japanese Government.

1. Anemia, Leukemia
2. Liver abnormalities (not hepatitis)
3. Cancer
4. Endocrine: diabetes mellitus
5. Stroke
6. Hypertensive cardiovascular disease
7. Chronic nephritis, nephrotic syndrome
8. Cataracts
9. Respiratory dysfunctions
10. Lung cancer
11. Certain arthritides
12. Ulcers and G.I. inflammations

These are all reasonable but they are only labels. For example: what cancers? All cancers? I don't know how liberally or restrictedly they are applied by Japan.

3. England A Prof. Geoffrey Rose of the London School of Hygiene and Tropical Medicine, after studying 39,000 death certificates of workers in U.K. nuclear plants, concludes there is:

8 x increase in Cancer of Prostate

Slight elevation in Leukemias

(This is interesting because a recent publication of Nat. Research Council co-authored by Dr. Jablon, gives the reverse results.)

4. Canada A Canadian Atomic Vet. reports, unofficially, "They are doing what they can for our fellows now - but it's on some other footing. They're not calling it radiation injury."

5. Finally, this list published by V.A. a year ago, due to expire. It's a good list, but with the present "dose" assignment policy in effect you could have the Sermon on the Mount and nothing would happen. (See photocopied list attached.)

6. A word on Claims. So far only 1½% of Crossroads veterans have applied for disability pensions. (500 out of 42,000) About 1½% of all atomic veterans have applied (2997 out of 220,000.)

I believe the number might reach 3% to 5%; perhaps higher. On the other hand, a considerable number of symptoms I hear about sound much more like anxiety phenomena than radiation disease. These would tend to disappear when veterans feel they are dealing with an open, honest, fair and friendly V.A.

David Bradley

Reported as latest Policy of V.A. -- The "radiogenic diseases":

- -- All forms of lukemia, except chronic lymphatic lukemia
- -- Thyroid cancer
- -- Female breast cancer
- -- Lung cancer
- -- Bone cancer
- -- Liver cancer
- -- Skin cancer, including malignant melanoma?
- -- Esophageal cancer
- -- Stomach cancer
- -- Colon cancer
- -- Pancreatic cancer
- -- Kidney cancer
- -- Urinary bladder cancer
- -- Salivary gland cancer
- -- Multiple myeloma

including Lymphoma?

Brain tumors
Cancer of Prostate
now reported in U.S. and England as very late radiogenic malignancies

- whether the disease became manifest within a specified period after disclosure
  - -- lukemias and bone cancer must become manifest within thirty years Probably reasonable
  - -- other cancers must become manifest five years or more after exposure reasonable

If these factors are established in a particular case, the VA then determines if it is at least as likely as not that radiation exposure caused a service-connected disability. To do this, the VA considers

This is the Hooker
If present "dose reconstruction" is used, the above list is pure window dressing.

- * the dose of radiation to which the veteran was exposed
- the veteran's gender, age at exposure, and family history
- the time lapse between exposure and the onset of the disease
- the nature of the disease
- the veteran's non-service related exposure to radiation or other carcinogens

In Not one Individual veteran's case can "dose reconstruction" give an honest and accurate dose.

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Box 707, Eldon, Missouri 65026

WRITTEN QUESTIONS FROM SENATOR SPECTER TO MR. FULTZ

AND THE RESPONSES

1. Your report on Operation Crossroads raises several troublesome questions about the quality of advice the government received in developing and executing the nuclear tests over the last 3 decades. Given the lack of caution you indicate was exercised in conducting the tests, do you believe that the government was inadequately warned of the physical consequences of insufficiently protecting test personnel by the companies involved in developing the tests?

Response:

We are not aware of private companies being involved in developing the Operation Crossroads tests. That operation was developed by a joint Army-Navy task force and responsibility for Crossroads radiation safety was largely that of Colonel Stafford Warren, who was also in charge of radiation safety during the Manhattan Project and during the first nuclear test detonation--Test Trinity--at Alamogordo, New Mexico.

2. At the last hearing on this subject, I asked Assistant Secretary of Energy Don Ofte if he felt the advice the government had gotten from their consultants was wanting in any way. He responded that the DNA had received and followed the best available recommendations from the scientific, academic and defense industry communities in conducting their tests. Do your findings support that assertion?

Response:

At Operation Crossroads, Colonel Warren, who was in charge of radiological safety, convened a group of medical and scientific experts--known as a Medical-Legal Board--to advise him on radiation safety at that operation. The board met on several different occasions during the operation and offered many opinions and recommendations to Colonel Warren to improve radiation safety, most of which Colonel Warren, in turn, recommended to the commander of the Crossroads joint task force. Available Crossroads records indicate that a majority of Colonel Warren's recommendations were implemented. The following table, included in our report as appendix I, shows the date recommendations were made and the military response to those recommendations.

Date	Recommendation	Whether or not implemented
April 27, 1946	All fresh water tanks should be filled prior to the entry of any ship into contaminated water, and no ships should operate their distilling plants unless absolutely necessary.	No
August 3, 1946	The intervening time between August 3 and August 14, 1946, should be spent on working on only those target ships with little radioactive contamination or where the usefulness to the task force is great and the effort and rush is worthwhile;	No
	the remaining target ships, such as the *Independence* and the *Pensacola*, should be declared hopelessly contaminated, towed to shallow water, beached, and time allowed for radioactive decay to take place; and	No
	as much scientific equipment as it is safe to do so should be rescued.	Yes
August 7, 1946	The present operations in the Bikini lagoon should be terminated on or by August 15, 1946, since there is neither equipment nor adequate monitoring personnel available to continue safety operations beyond this date;	Yes
	a small force should be organized and left at Bikini as a stop gap to continue (1) small scale studies of decontamination procedures, (2) recovery of scientific instruments, and (3) prevent the sinking of whatever vessels that can be saved without risk of exposing personnel to dangerous amounts of radioactivity; and	Yes

Date	Recommendation	Whether or not implemented
August 7, 1946 (continued)	if it is contemplated that the task force return to Bikini either for further study of the problem of decontamination or to prepare for a third nuclear test, the proper arrangements should be made and facilities should be made available to handle the problem of decontamination on a large scale.	Not Applicable[a]
August 13, 1946	No further work must be permitted in the contaminated target ships without well organized and adequate safeguards including special equipment for personnel and proper radiological equipment; and	Yes
	the present use of task force personnel should be restricted to the recovery of instruments and limited to surveys consistent with radiological safety.	Yes
January 6, 1947	Only those target ships should be saved that are considered to be a definite experimental or training value to the Navy. The rest should be disposed of by sinking in deep water in the open ocean.	No

[a] This recommendation is not applicable given that the military did not return to Bikini either for further study of the problem of decontamination or to prepare for a third nuclear test.

3. You note that the instruments used in measuring the level of radiation absorbed by test participants were not acceptably reliable. Is it the opinion of the GAO that these implements were primitive by the standards of the day or was the DNA using the most up-to-date and reliable equipment available?

Response:

The principal device used to measure personnel radiation exposure at Operation Crossroads was the film badge--a small piece of film encased in a metal or plastic container and pinned to clothing. The film badge was, in 1946, considered one of the best instruments an individual could wear for measuring external radiation exposure. However, it was also understood and recognized that the film badge could not measure internal radiation exposure received from inhaling or ingesting radioactive materials, or from cuts inflicted by radioactive objects. Indeed, no personnel device exists today to measure internal radiation exposure. Should such an exposure occur or be feared, only medical analysis (through urinalysis testing, for example) can determine the degree of exposure.

4. 99 percent of the claims of nuclear test participants have been turned down by the VA. In your estimation, and realizing that your comments are based primarily on your observations of the Operation Crossroads project, is it likely that this high rate of denial may be the result of a widespread inaccuracy in assessing actual injuries incurred by nuclear test participants?

Response:

We are aware that, as of June 1985, approximately 540 claims related to veterans' participation in Operation Crossroads have been filed at the Veterans Administration and none have been approved. However, we do not know whether their denial is the result of a widespread inaccuracy in assessing actual injuries incurred by Crossroads participants.

We did not address health aspects in our review of Operation Crossroads, but focused exclusively on calculation of radiation exposure estimates for Crossroads personnel.

5. Did the GAO find, or does it believe, that the problem that occurred at Operation Crossroads were widespread or is it your belief that the shortcomings you cite in this case were probably unique? If you believe there are faulty practices that were widespread, on whom, the contractor or the agency, would the blame appropriately fall?

Response:

We reviewed only radiation safety at Operation Crossroads. Therefore, we do not know whether our findings regarding that operation may also be applicable to other nuclear tests. However, as part of a November 15, 1985, request from Senator Alan Cranston, we have been asked to review a nuclear test in the 1950's at the Nevada Test Site to determine if safety procedures improved over those at Operation Crossroads. Upon completing that review we will be in a better position to comment on whether safety precautions improved during the course of the atmospheric nuclear weapons testing program and, if so, to what extent.

6. In your view, are the regulations that the VA has published in compliance with the Veterans' Dioxon and Radiation Exposure Compensation Standards Act sufficient to meet the problem of exposure to ionizing radiation or should they be broadened to account for the implications of your findings? If they should be broadened, in what specific areas would you suggest improvement in the guidelines?

Response:

At this time we do not have sufficient information on which to make a judgment. However, Senator Cranston, as part of his November 15, 1985, request, has asked us to review this issue.